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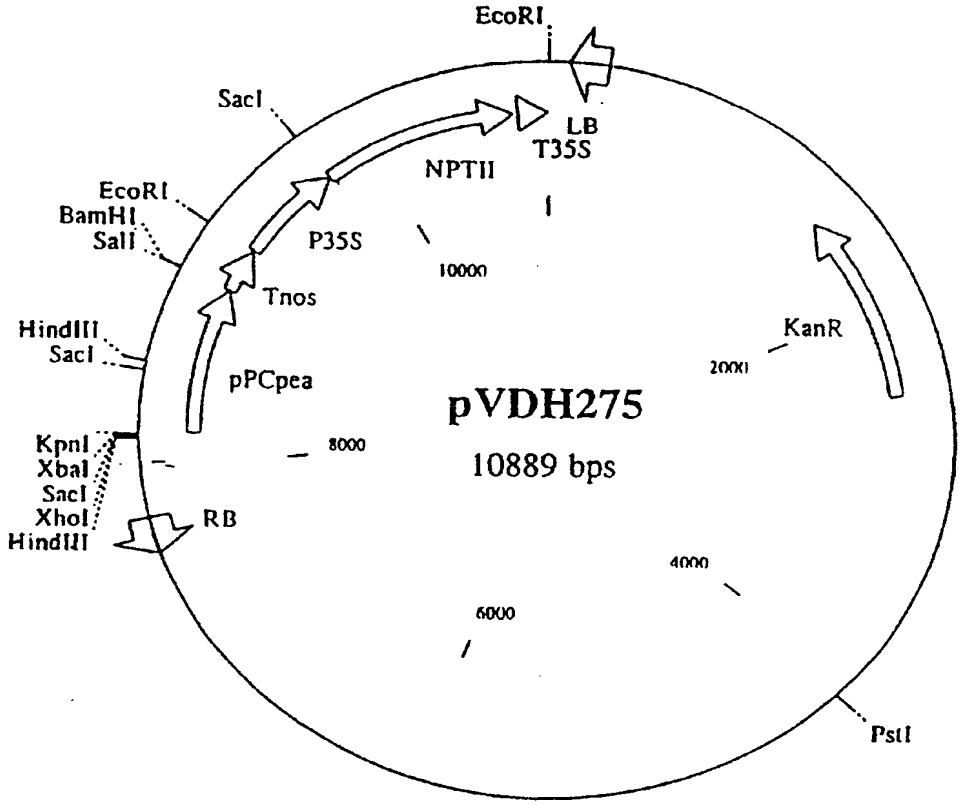

EcoRI
SacI
LB
T35S
NPTII
EcoRI
BamHI
SalI
P35S
10000
Tnos
HindIII
SacI
KanR
2000
pPCpea
pVDH275
10889 bps
KpnI
XbaI
SacI
XhoI
HindIII
8000
RB
4000
6000
PstI

Fig. 1

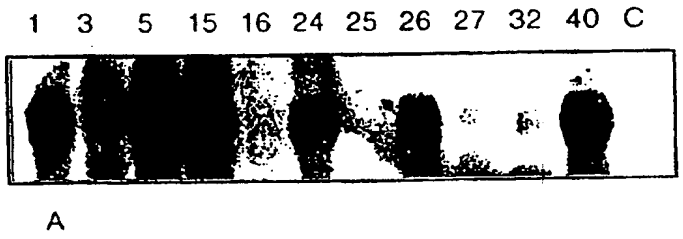


Fig. 2

LINEUP of: TPSPLANT from: 1 to: 595 April 19, 1996 14:01 ..

```
            1                                                    50
  Tpsyeast  MTTDNAKAQL TSSSGGNIIV VSNRLPVTIT KNSSTGQYEY AMSSGGLVTA

            51                                                   100
  Tpsyeast  LEGLKKTYTF KWFGWPGLEI PDDEKDQVRK DLLEKFNAVP IFLSDEIADL

            101                                                  150
   Tpssel8                                                      .
  Tpsyeast  HYNGFSNSIL WPLFHYHPGE INFDENAWLA YNEANQTFTN EIAKTMNHND

            151                                                  200
  Tpsrice2                                                  YRSLPVR
  Tpssun10                                  GWFLHTPFPS SEVYKTLPMR
  Tpssel43                                  GWFLHTPFPS SEIYRTLPLR
   Tpssel8  IMWVHDYHLC LVPQMIRQKL PDVQI..... GFFLHTAFPS SEVFRCLAAR
  Tpsyeast  LIWVHDYHLM LVPEMLRVKI HEKQLQNVKV GWFLHTPFPS SEIYRILPVR

            201                                                  250
  Tpsrice2  DEILKSLLNC DLIGFHTFDY ARHFLSCCSR MLGIEYQSKR GYIGLDYFGR
  Tpssun10  NELLKGLLNA DLIGFHTYDY ARHFLTCCSR MFGLDHQLKR GYIFLEYNGR
  Tpssel43  AELLQGVLGA DLVGFHTYDY ARHFVS.... ..AMHTDTRA GRHSQGVEDQ
   Tpssel8  KELLDGMLGA NLVAFQTPEY AHHFLQ.... ..XVQSHXSL LKQRP.....
  Tpsyeast  QEILKGVLSC DLVGFHTYDY ARHFLSSVQR VLNVNTLPNG VEYQGRFVNV

            251                                                  300
  Tpsrice2  TVGIKIMPVG INMTQLQTQI RLPDLEWRVA NSGSSLMGRL SCSVWMIWTY
   Ricetps                  EWRV SELQQQFEGK .......TVL ....LGVDDM
  Tpssun10  SIEIKIKASG IHVGRMESYL SQPDTRLQVQ EVK..KEIVL ....LGVDDL
  Tpssel43  GKITRVAA.. FPVDRFGAIY RRVETDAVKK HMQELSQVLL S*GYVGVDRL
   Tpssel8  ......KA.. FS.XRFVNVW ...SX..MQE ALRXVKKVIV ARDKLTTSR.
  Tpsyeast  GAFPIGIDVD KFTDGLKKES VQKRIQQLKE TFKGCKIIV. .....GVDRL

            301                                                  350
  Tpsatal3                                                      .G
 Tpsatal56                      N EELRGKVVLV QITNPARSS. .........G
  Tpsrice2  LR..GLI*KF LRFEQMLRTH PKWQPRQFWC RFKPRVVVGR TLXYSXDXXV
   Ricetps  DIFKGINLKL LAFENMLRTH PKWQGRAVLV QIANPARGK. .........G
  Tpssun10  DIFKGVNFKV LALEKLLKSH PSWQGRVVLV QILNPSR.R. .........C
  Tpssel43  DMIKGIPQKL LAFEKFLEEN SEWRDKVVLV QIAVPTRTD. .........V
   Tpssel8  .....VREKL LSYELFLNKN PQWRDKVVLI QVATSTTEDS ELAATXYPKL
  Tpsyeast  DYIKGVPQKL HAMEVFLNEH PEWRGKVVLV QVAVPSRGDV EEYQYLRSVV
```

Fig. 3A

```
                351                                                    400
 Tpsatal3   IDVEEIRGEI EESCRRING. EFGKXGYQPI  IYIDXPVSIN EINAYXHIAE
Tpsatal56   KDVQDVEKQI NXIADEINSK FGRPGGYKPI  VFVNGPVSTL DKVAYYAISE
 Tpsrice2   QXVMTFQAGI SL
  Ricetps   KDLEAIQAEI HESCKRING. EFGQSGYSPV  VFIDRDVSSV EEDCLLHNSR
 Tpssun10   QDVDEINAEI RTVCERINN. ELGSPGYQPV  VLIDGPVSLS EKAAYYVIAD
 Tpssel43   LEYQKLTSQV HEIVGRING. RFGSLTAVPI  HHLDRSMKFP ELCALYAITD
  Tpssel8   LHVLTLCTRR SHTPTRLPQ. ARHCVLAVPR  TSLDRRCSCN QLF.......
 Tpsyeast   NELVG..... .....RING. QFGTVEFVPI  HFMHKSIPFE ELISLYAVSD

                401                                                    450
 Tpsatal3   CVVVTAVRDG MNLTPYEYIV CRQGLLGSES  DFSGPKKSML ....VASXFI
Tpsatal56   CVVVNXVRDG MNLVPYKYTV TRQGSPALDA  ALGFGEDDVR KSVIIVSEFI
Tpsatal142                                    AVVDSSPR TSTLVVSEFI
 Tpsrice3                                         GPK KSMLVVSEFI
  Ricetps   MCGGDCC*GW D*LDTIWIYC L*GRGLTXHQ  R
 Tpssun10   MAIVTPLRDG MNLV
 Tpssel43   VLLVTSLRDG MNFV
  Tpssel8   ........DG MNLV
 Tpsyeast   VCLVSSTRDG MNLVSYEYIA CQEE......  .........K KGSLILSEFT

                451                                                    500
 Tpsatal3   WMXPFRLXGA IRVNPW
Tpsatal56   GCXP.SLSGA IXVNPWNIXA V
Tpsatal142  GCSP.SLSGA IRVNPWDVDA VAEAVNSALK  MSETEKQLRH EKHYHYISTH
 Tpsrice3   GCSP.SLSGA IRVNPWNIEA TAEALNEAIS  MSERXKQLRH EKHYRYVSTH
 Tpsyeast   GAAQ.SLNGA IIVNPWNTDD LSDAINEALT  LPDVKKEVNW EKLYKYISKY

                501                                                    550
Tpsatal142  DVGTWAKSFM QDLERACRDH YSKRCWGIGF  GLGFRVLSLSP SFRKLS
 Tpsrice3   DVAYWSKSFV QDLERACKDH FRKPCWGIGX  GFRXR
 Tpsyeast   TSAFWGENFV HELYSTSSSS TSSSATKN**  TRCK*DDRLF LVRFSLPSLL

                551                                                595
 Tpsyeast   FTFFILYIKL YK*HN*NATR PLLFVNACL*  RC*LKLRK*F FHRIG
```

Fig. 3B

Alignment tobacco TPS genes with yeast TPS1

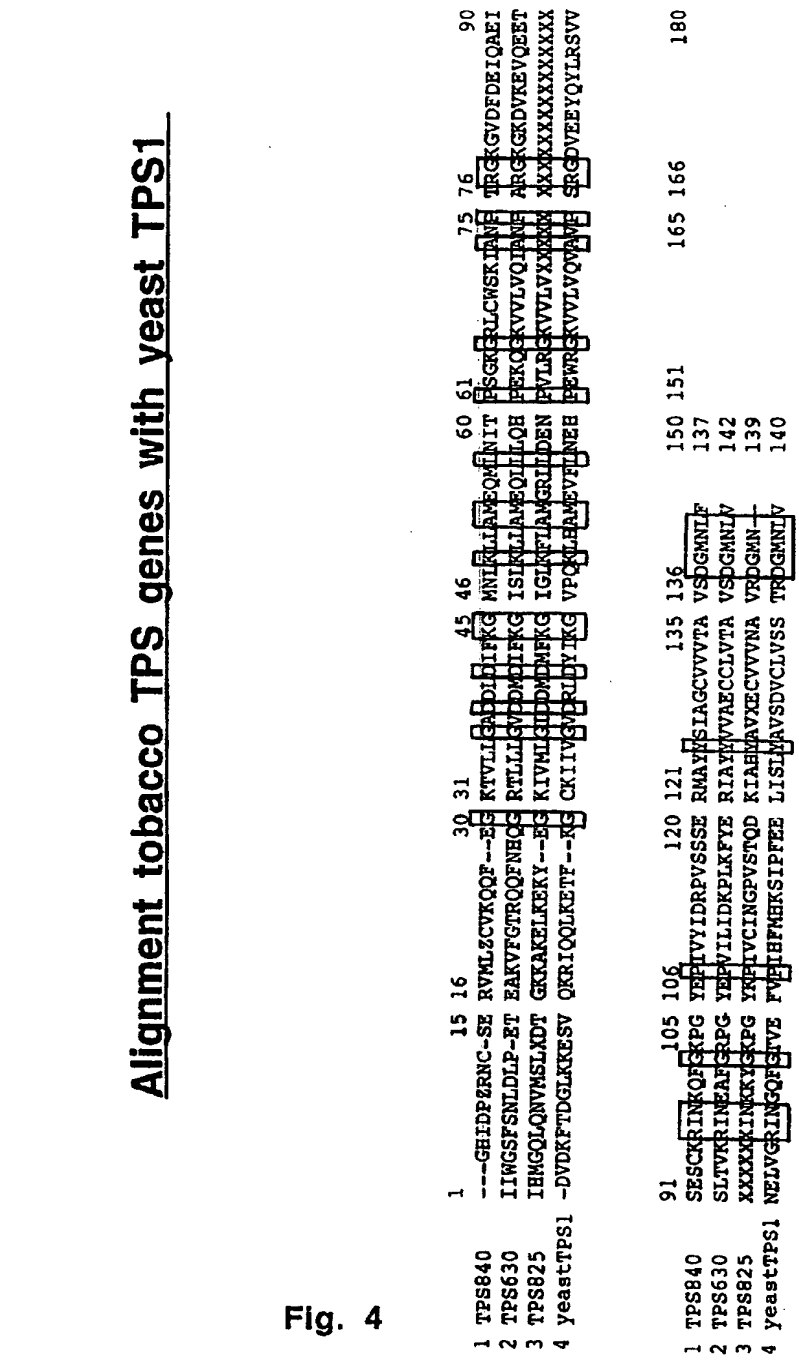


Fig. 4

Alignment tobacco TPP genes with yeast TPS2

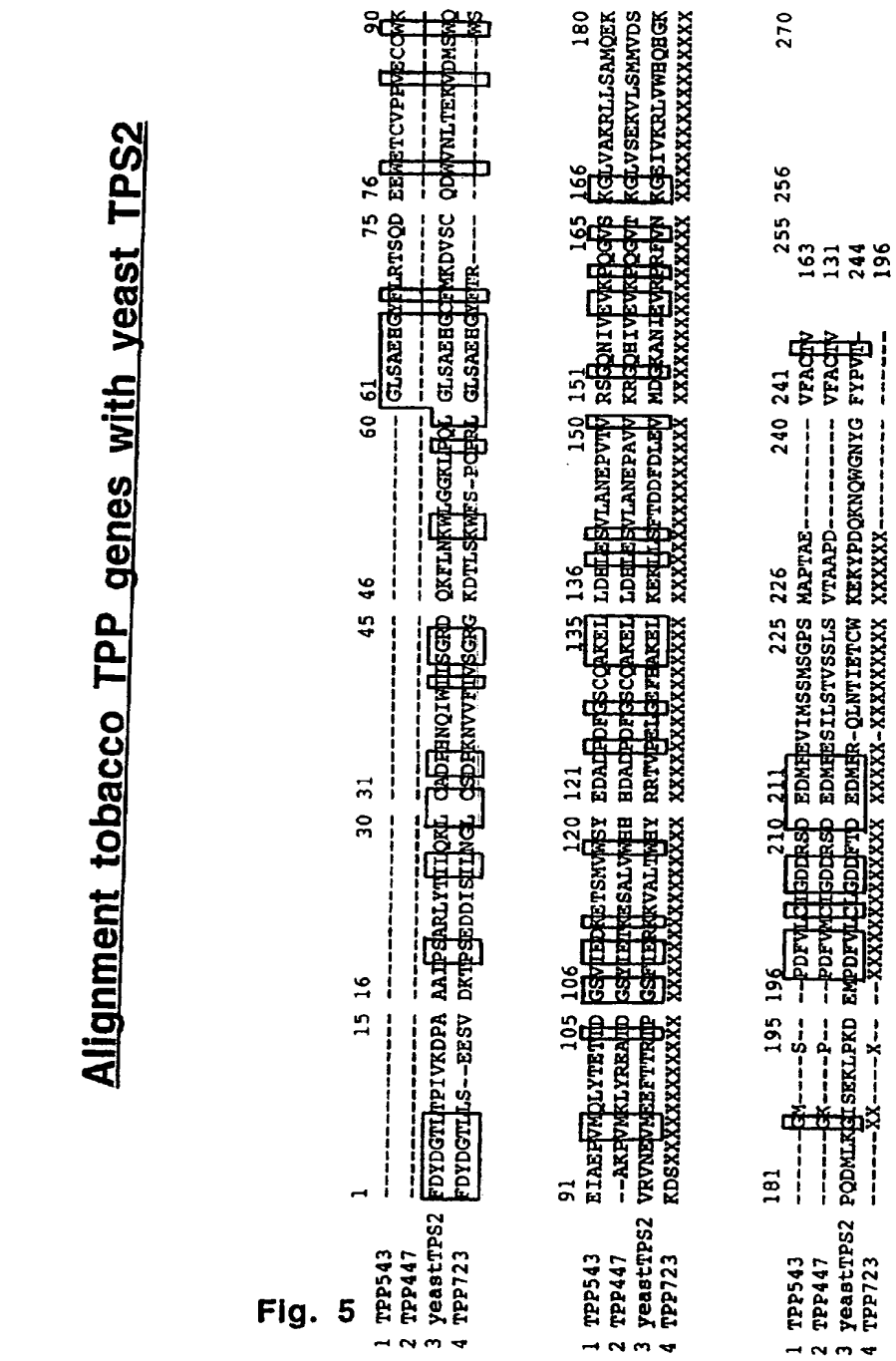


Fig. 5

Alignment sunflower bipartite with yeast TPS2

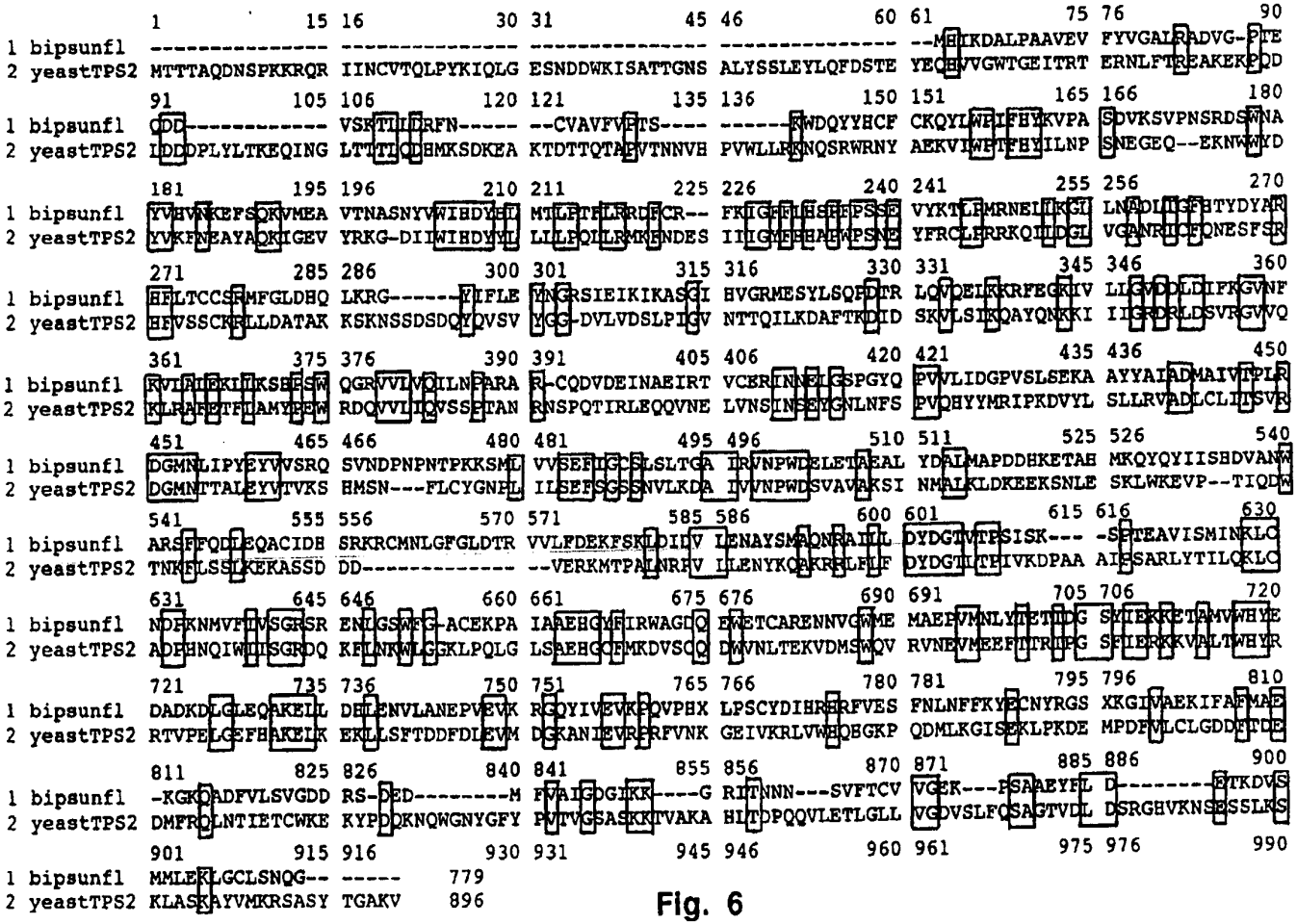


Fig. 6

Alignment plant TPS genes with yeast TPS1

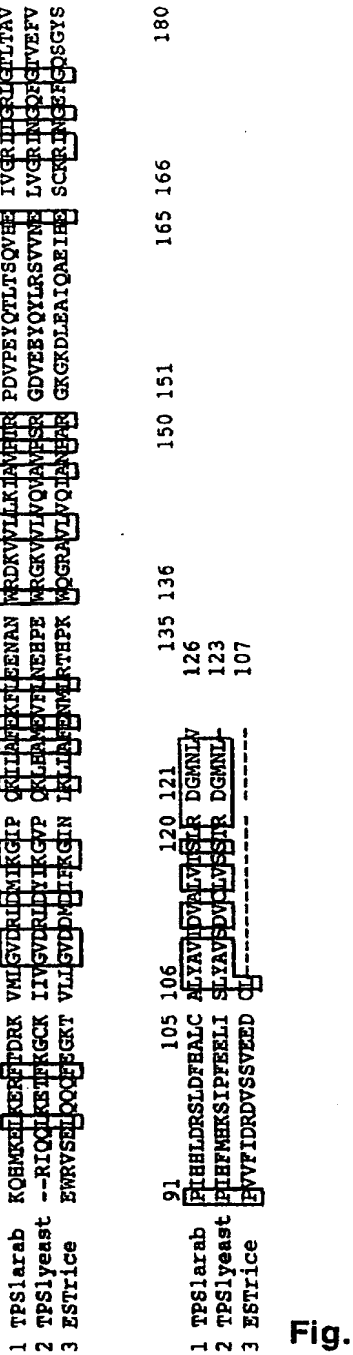


Fig. 7

Alignment human TPS gene with yeast TPS1

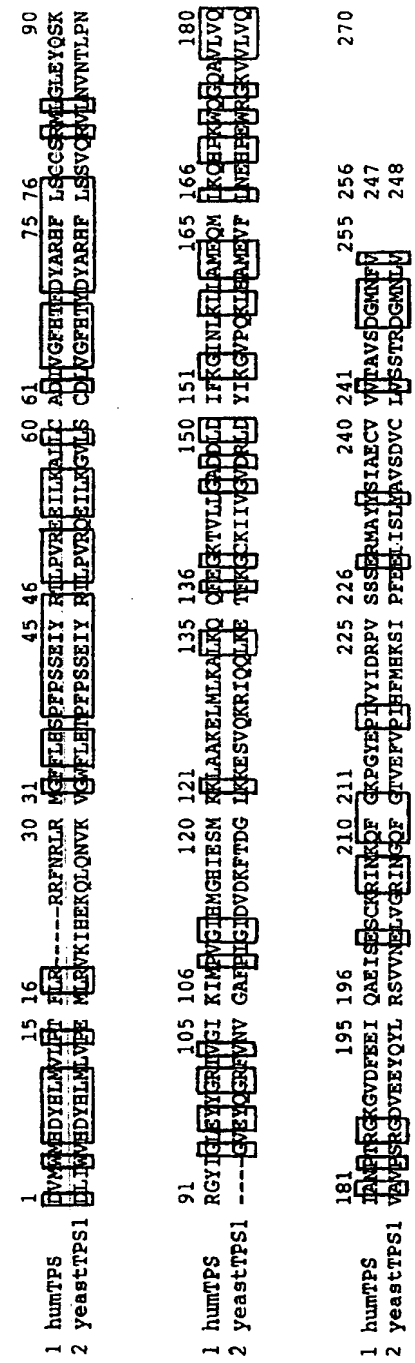


Fig. 8

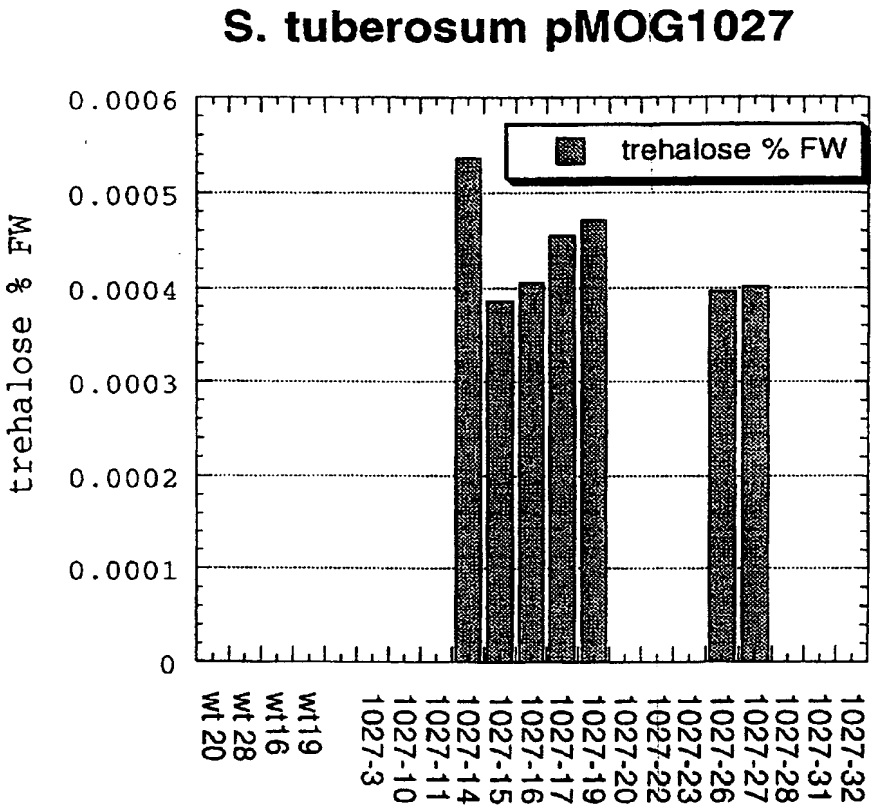

S. tuberosum pMOG1027
trehalose % FW
0.0006
0.0005
0.0004
0.0003
0.0002
0.0001
0
wt 20
wt 28
wt16
wt19
1027-3
1027-10
1027-11
1027-14
1027-15
1027-16
1027-17
1027-19
1027-20
1027-22
1027-23
1027-26
1027-27
1027-28
1027-31
1027-32

Fig. 9

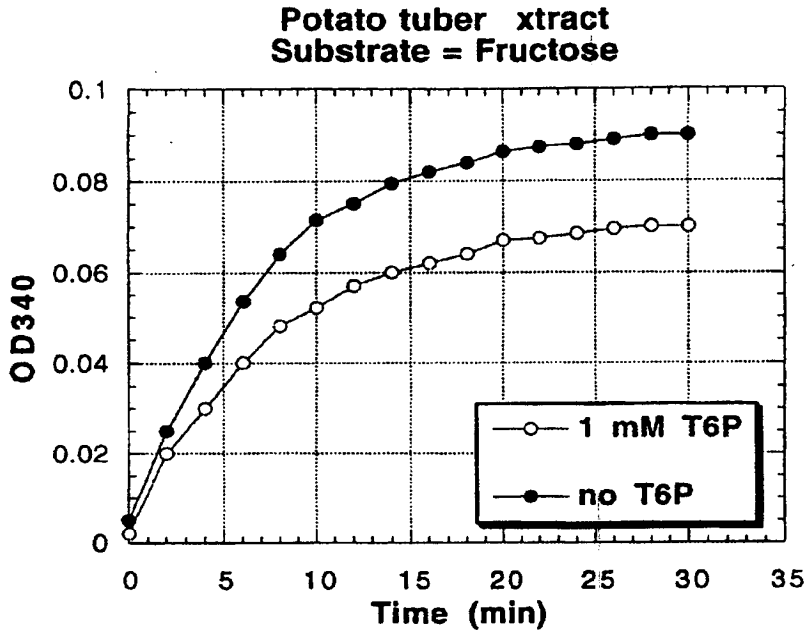

Potato tuber xtract
Substrate = Fructose
OD340
0.1
0.08
0.06
0.04
0.02
0
0
5
10
15
20
25
30
35
Time (min)
1 mM T6P
no T6P

Fig. 10

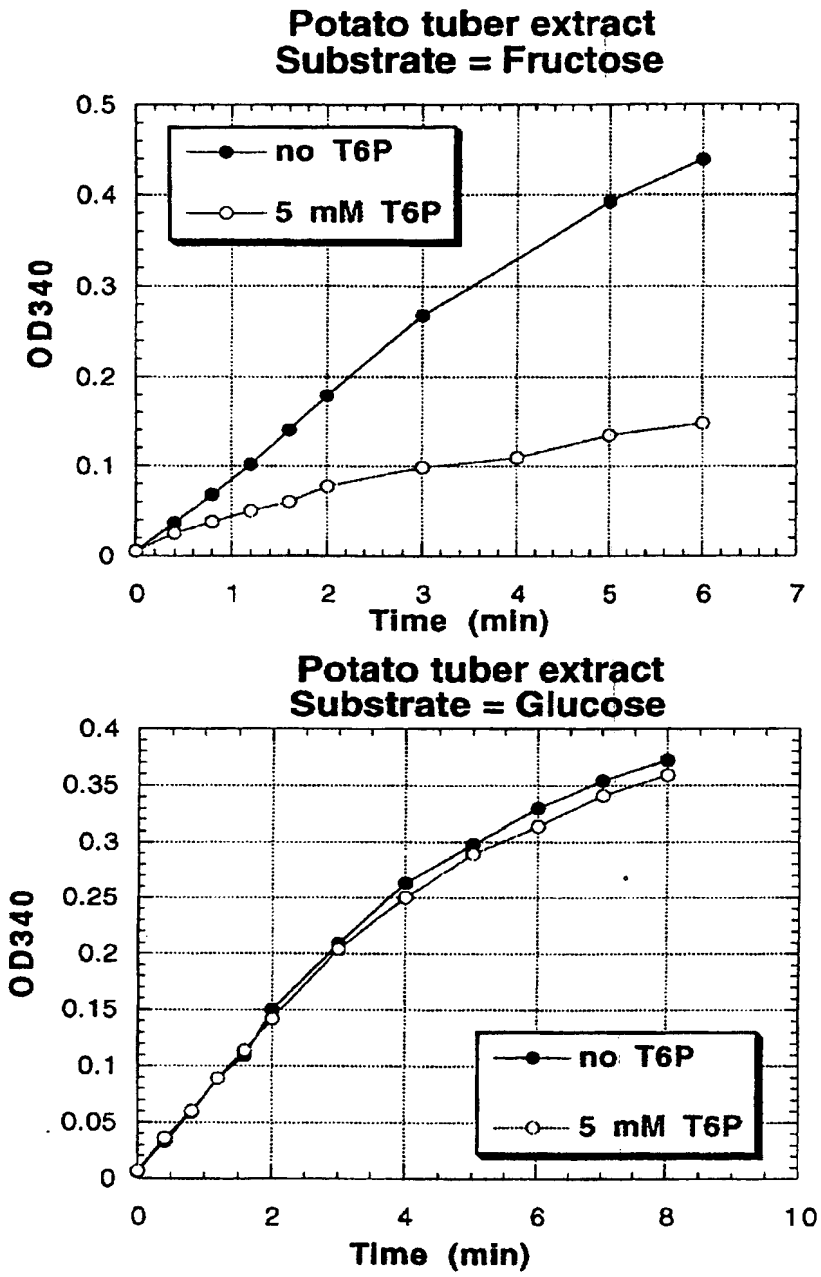

Potato tuber extract
Substrate = Fructose
OD340
Time (min)
no T6P
5 mM T6P
Potato tuber extract
Substrate = Glucose
OD340
Time (min)
no T6P
5 mM T6P

Fig. 11

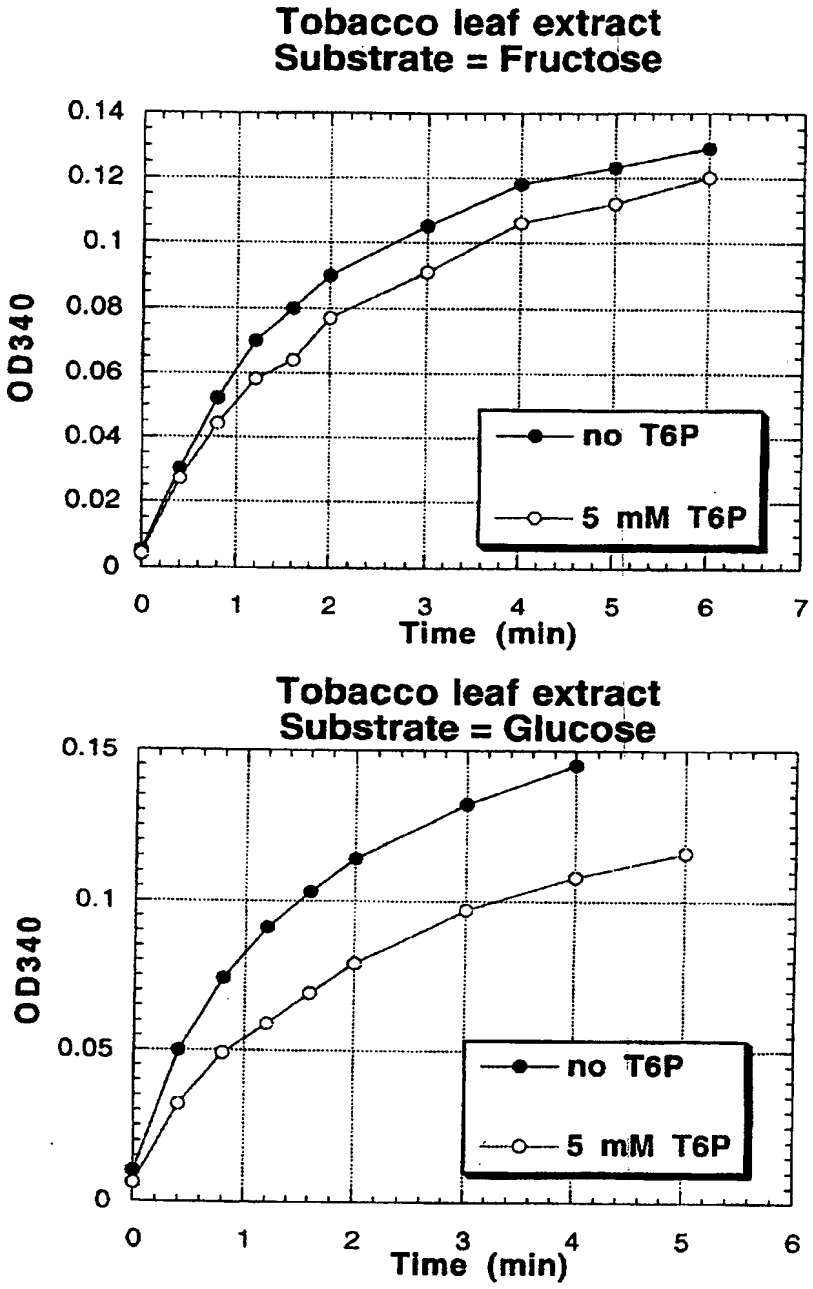

Tobacco leaf extract
Substrate = Fructose
OD340
0.14
0.12
0.1
0.08
0.06
0.04
0.02
0
0 1 2 3 4 5 6 7
Time (min)
no T6P
5 mM T6P
Tobacco leaf extract
Substrate = Glucose
OD340
0.15
0.1
0.05
0
0 1 2 3 4 5 6
Time (min)
no T6P
5 mM T6P

Fig. 12

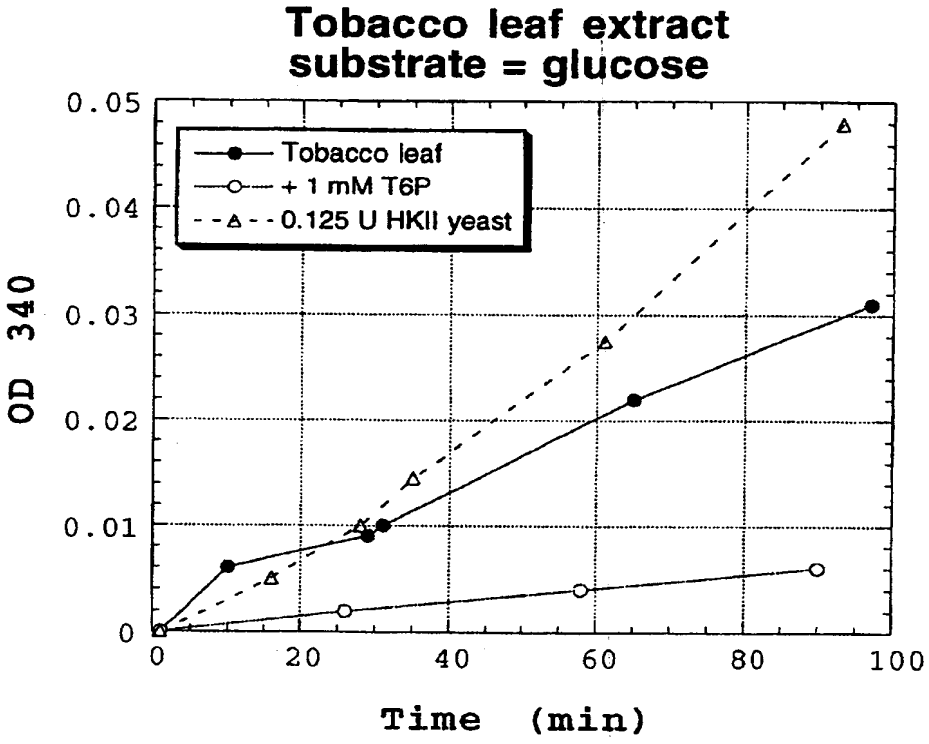

Tobacco leaf extract
substrate = glucose
Tobacco leaf
+ 1 mM T6P
0.125 U HKII yeast
OD 340
0.05
0.04
0.03
0.02
0.01
0
0
20
40
60
80
100
Time (min)

Fig. 13

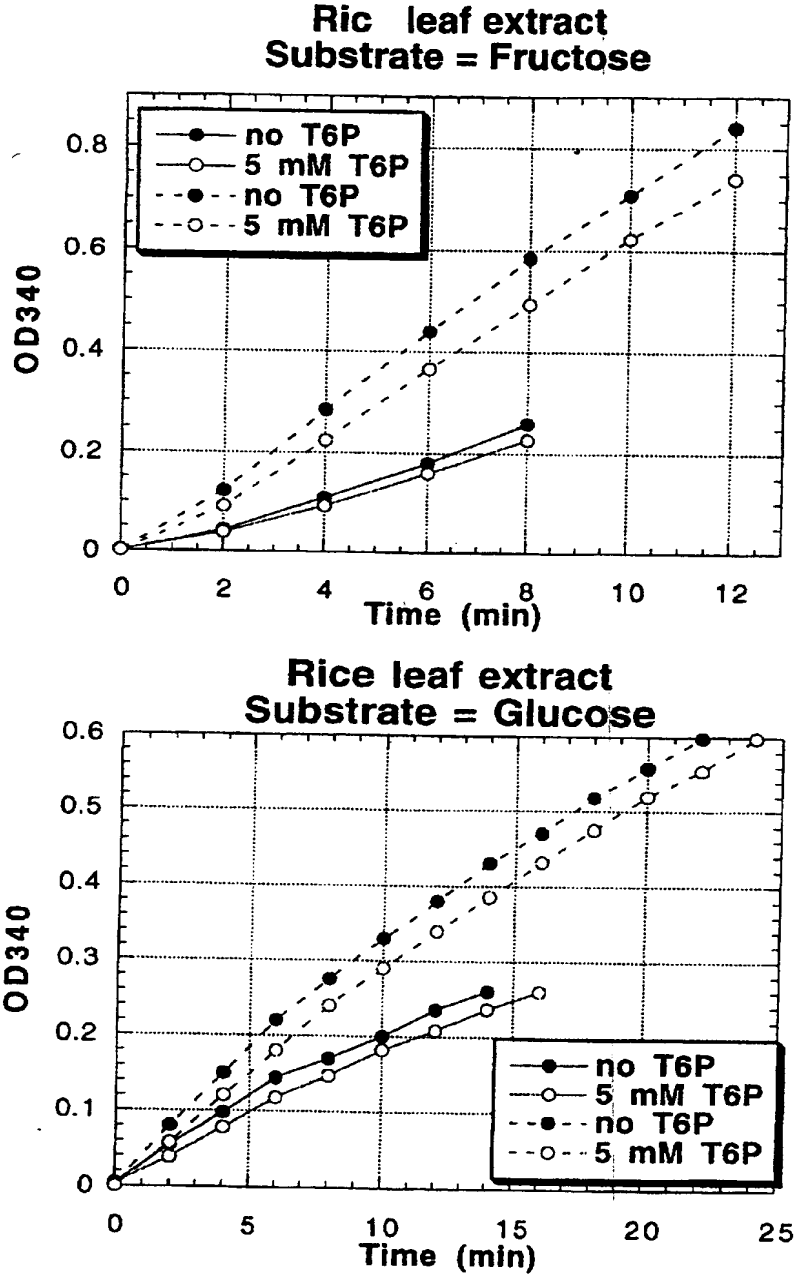

Ric leaf extract
Substrate = Fructose
no T6P
5 mM T6P
no T6P
5 mM T6P
OD340
Time (min)
Rice leaf extract
Substrate = Glucose
no T6P
5 mM T6P
no T6P
5 mM T6P
OD340
Time (min)

Fig. 14

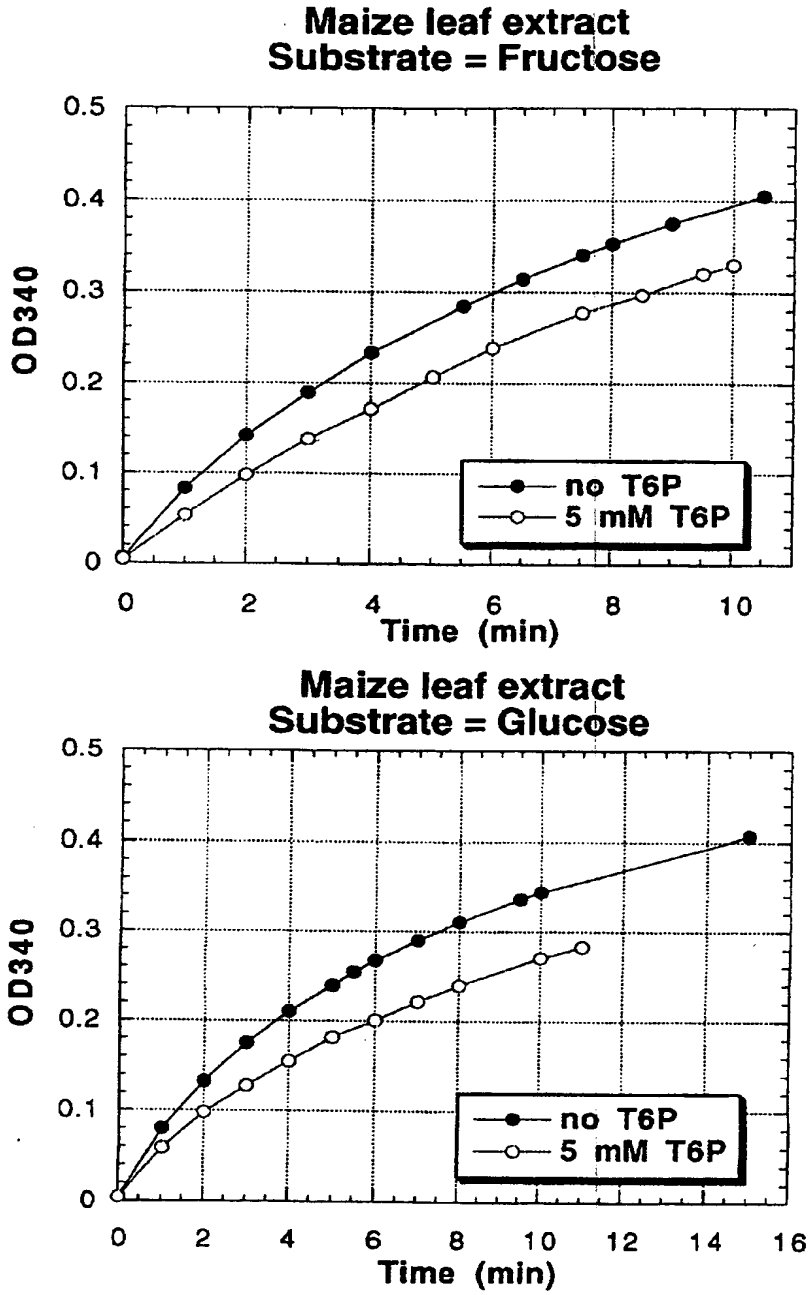

Maize leaf extract
Substrate = Fructose
OD340
0.5
0.4
0.3
0.2
0.1
0
0
2
4
6
8
10
Time (min)
no T6P
5 mM T6P
Maize leaf extract
Substrate = Glucose
OD340
0.5
0.4
0.3
0.2
0.1
0
0
2
4
6
8
10
12
14
16
Time (min)
no T6P
5 mM T6P

Fig. 15

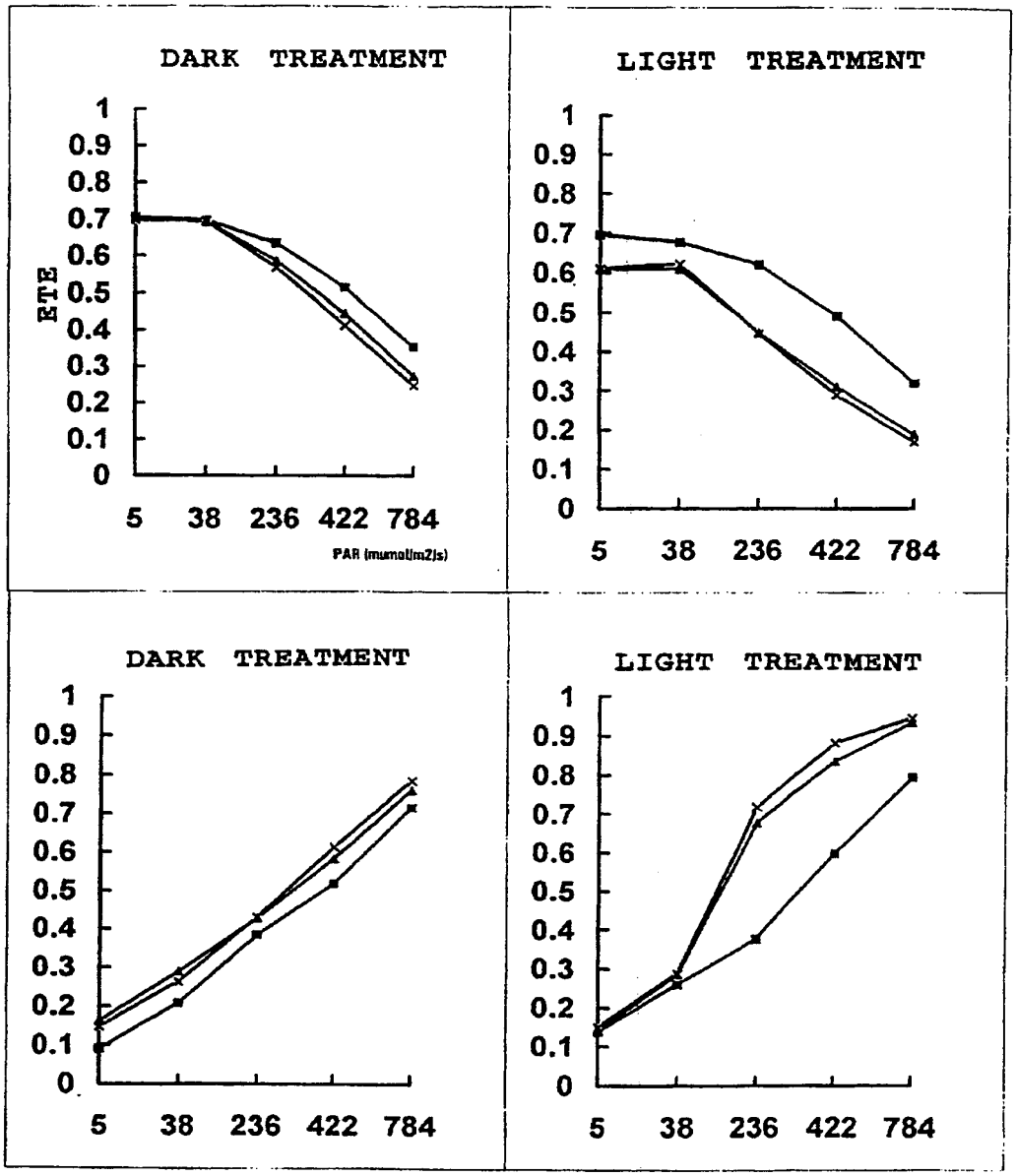

DARK TREATMENT
LIGHT TREATMENT
DARK TREATMENT
LIGHT TREATMENT
ETE
1
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0
5 38 236 422 784
PAR (mumol/m2/s)

Fig. 16

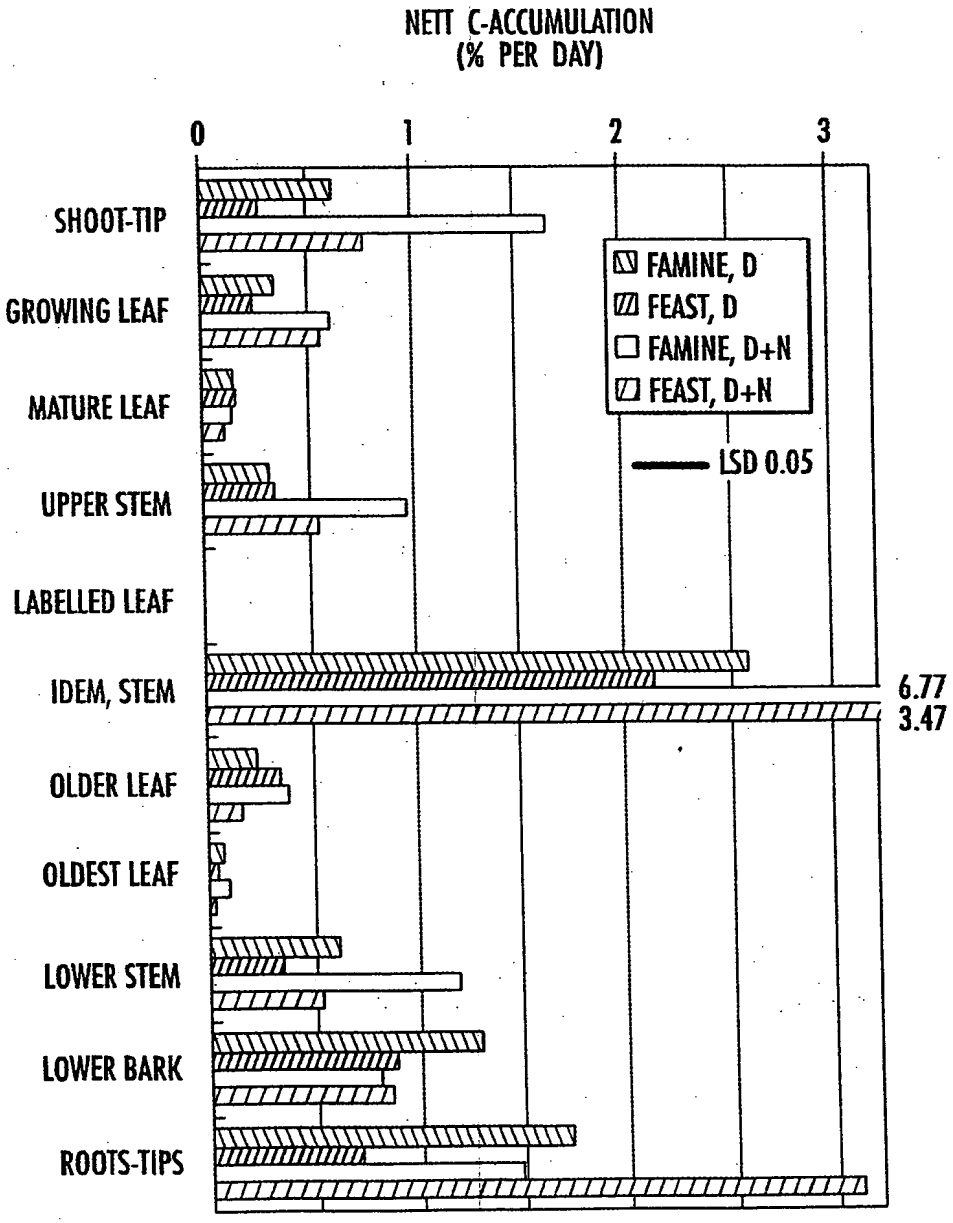

NETT C-ACCUMULATION
(% PER DAY)
0
1
2
3
SHOOT-TIP
GROWING LEAF
MATURE LEAF
UPPER STEM
LABELLED LEAF
IDEM, STEM
OLDER LEAF
OLDEST LEAF
LOWER STEM
LOWER BARK
ROOTS-TIPS
FAMINE, D
FEAST, D
FAMINE, D+N
FEAST, D+N
LSD 0.05
6.77
3.47

Fig. 17

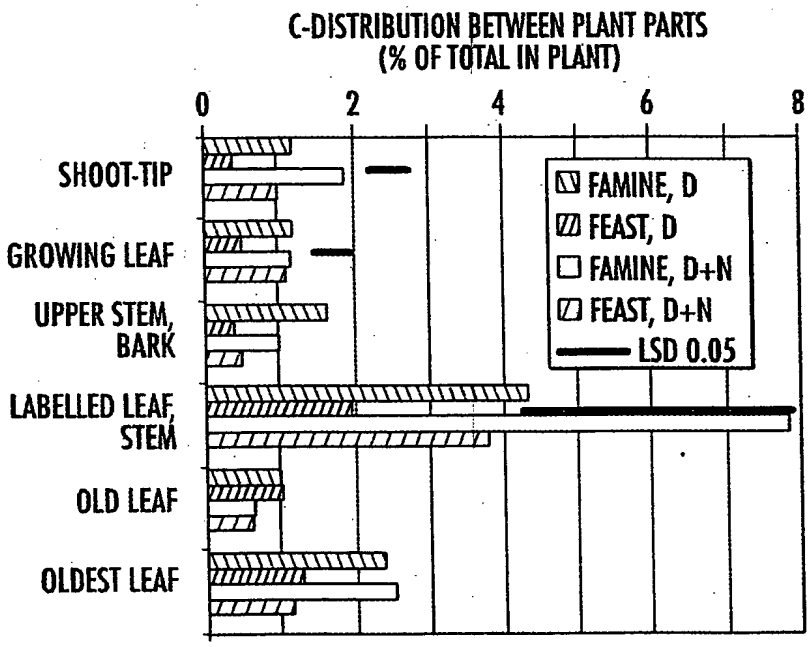
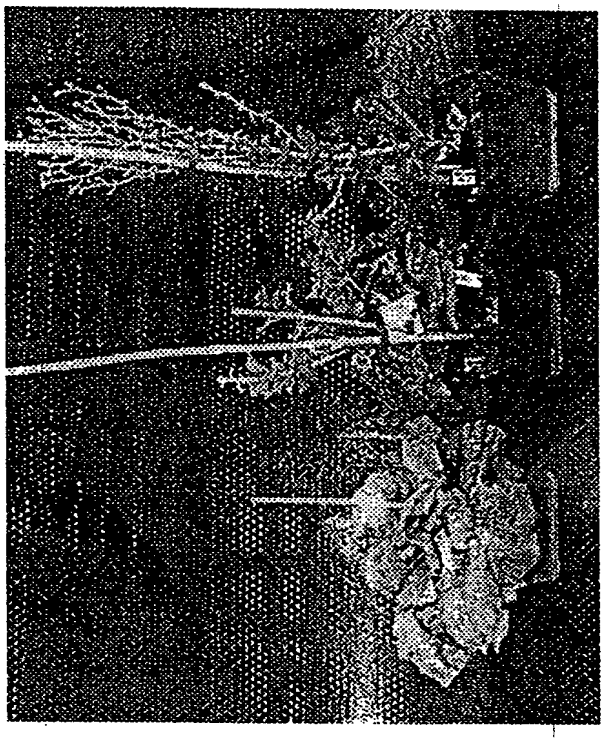

C-DISTRIBUTION BETWEEN PLANT PARTS
(% OF TOTAL IN PLANT)
0
2
4
6
8
SHOOT-TIP
GROWING LEAF
UPPER STEM, BARK
LABELLED LEAF, STEM
OLD LEAF
OLDEST LEAF
FAMINE, D
FEAST, D
FAMINE, D+N
FEAST, D+N
LSD 0.05

Fig. 18

Fig. 19



TPS

CONTROL

TPP

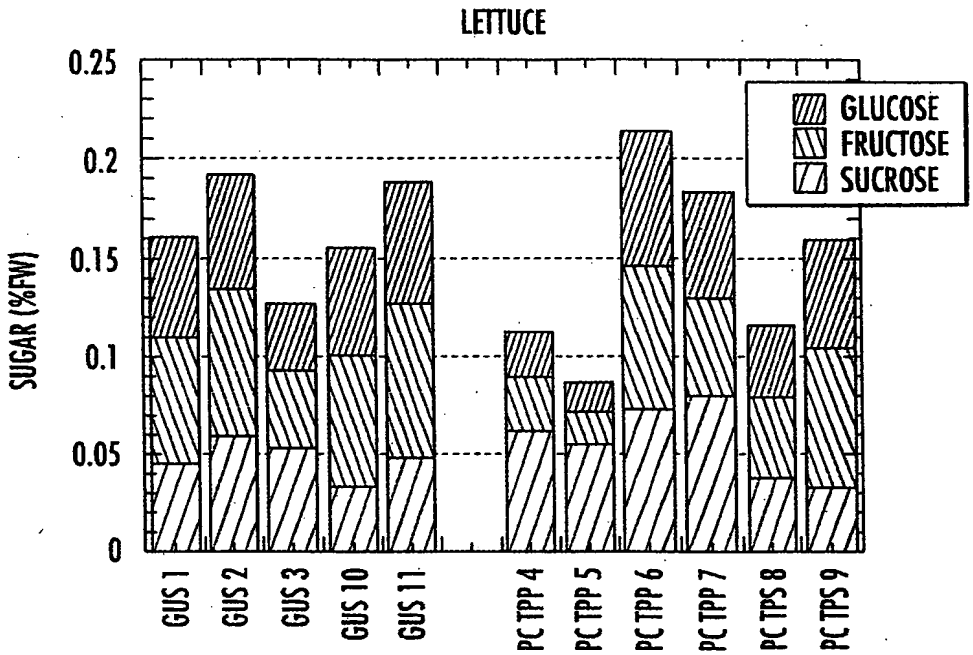


Fig. 20A

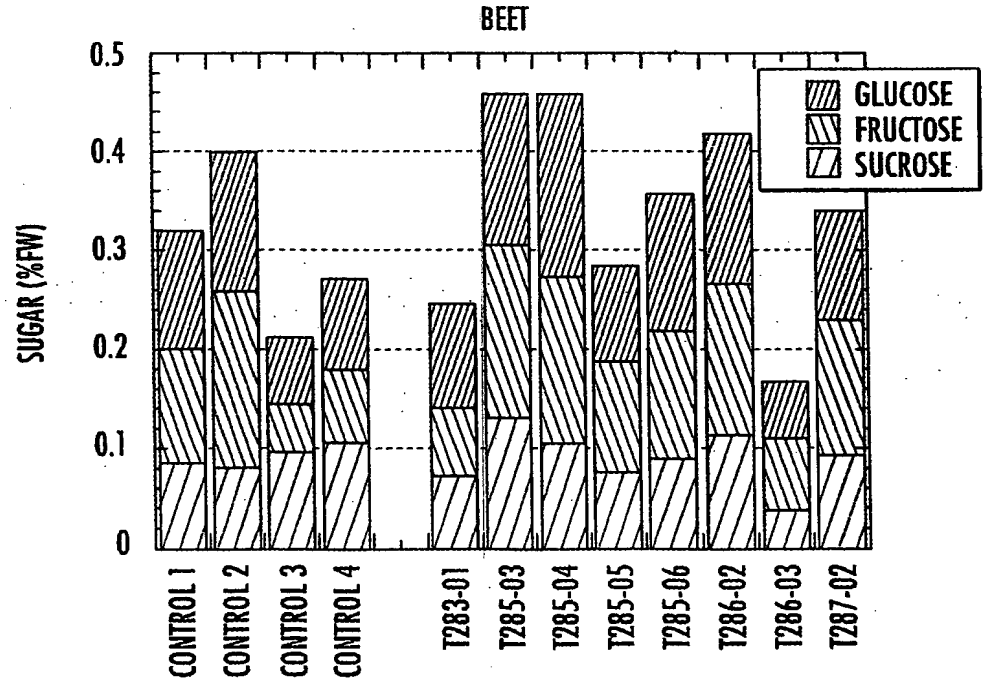


Fig. 20B

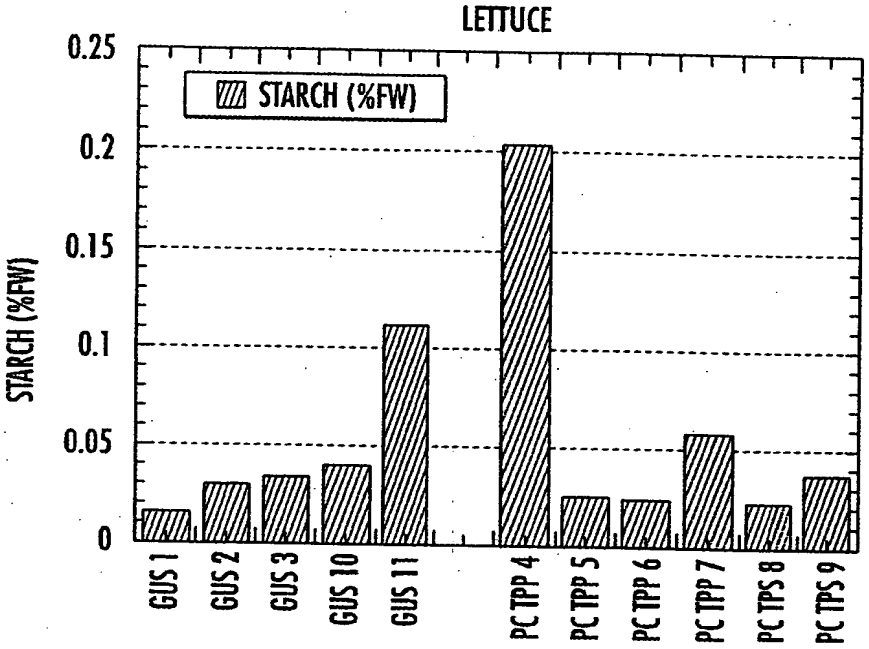


Fig. 20C

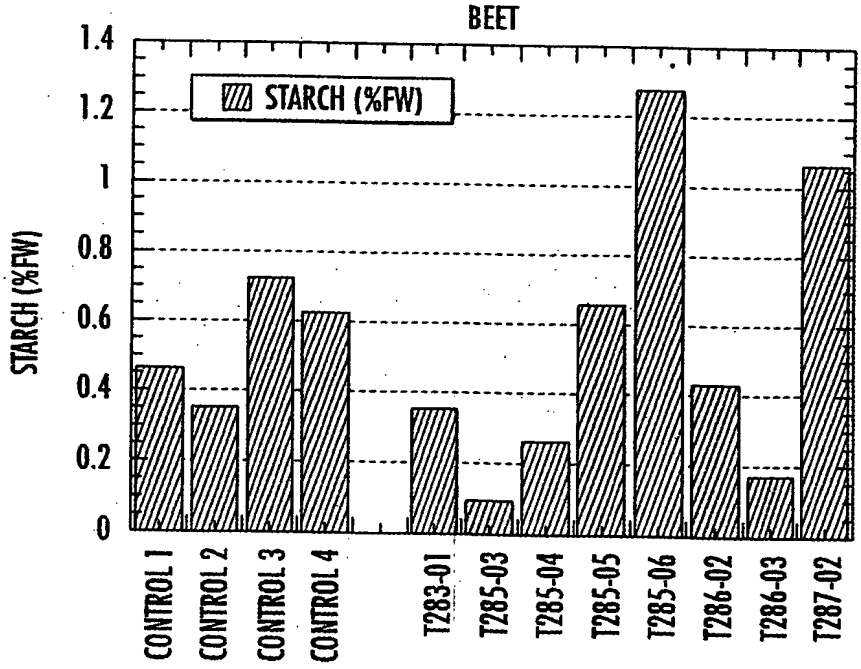
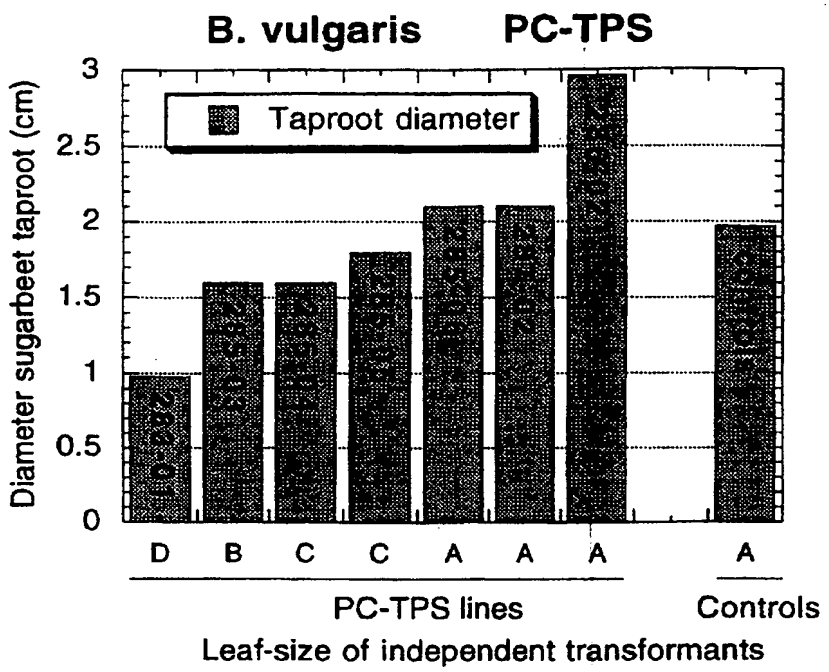


Fig. 20D

Fig. 21


B. vulgaris PC-TPS
Taproot diameter
Diameter sugarbeet taproot (cm)
3
2.5
2
1.5
1
0.5
0
D B C C A A A A
PC-TPS lines
Controls
Leaf-size of independent transformants

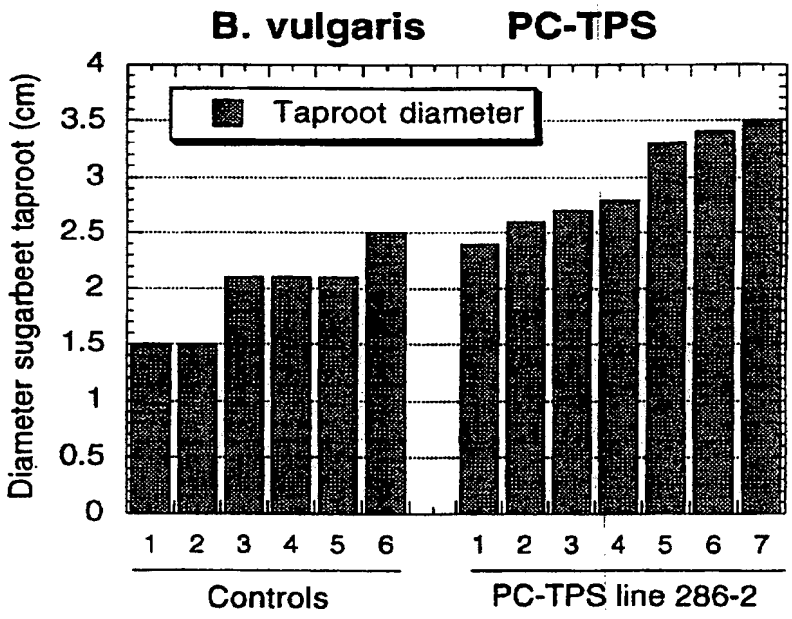

B. vulgaris PC-TPS
Taproot diameter
Diameter sugarbeet taproot (cm)
4
3.5
3
2.5
2
1.5
1
0.5
0
1 2 3 4 5 6
1 2 3 4 5 6 7
Controls
PC-TPS line 286-2

Fig. 22

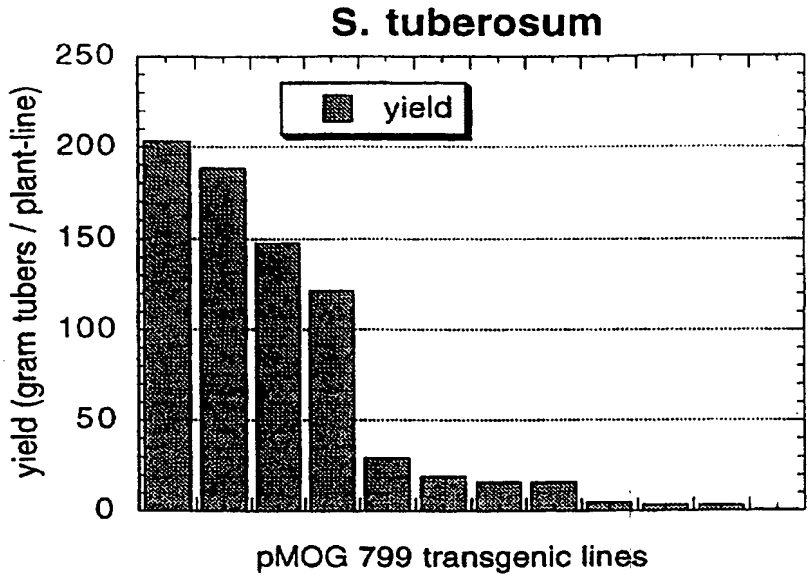

S. tuberosum
yield
yield (gram tubers / plant-line)
250
200
150
100
50
0
pMOG 799 transgenic lines

Fig. 23

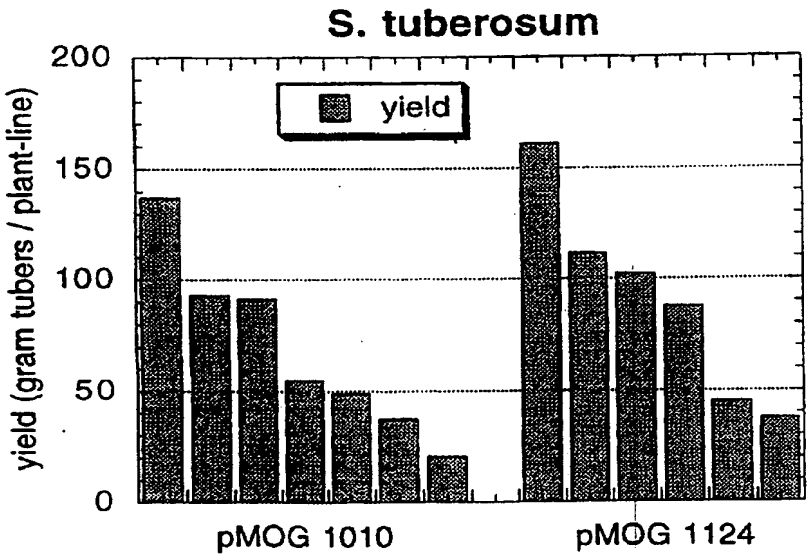

S. tuberosum
yield
yield (gram tubers / plant-line)
200
150
100
50
0
pMOG 1010
pMOG 1124

Fig. 24

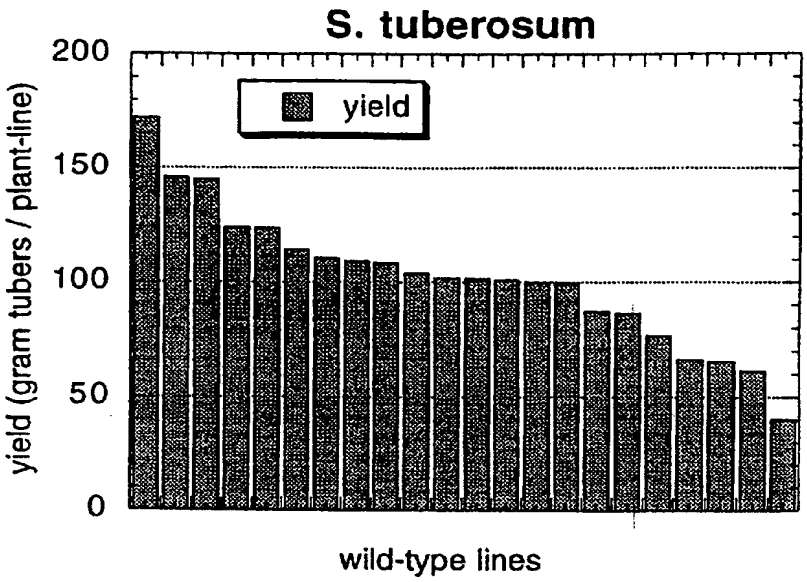

S. tuberosum
yield
200
150
100
50
0
yield (gram tubers / plant-line)
wild-type lines

Fig. 25

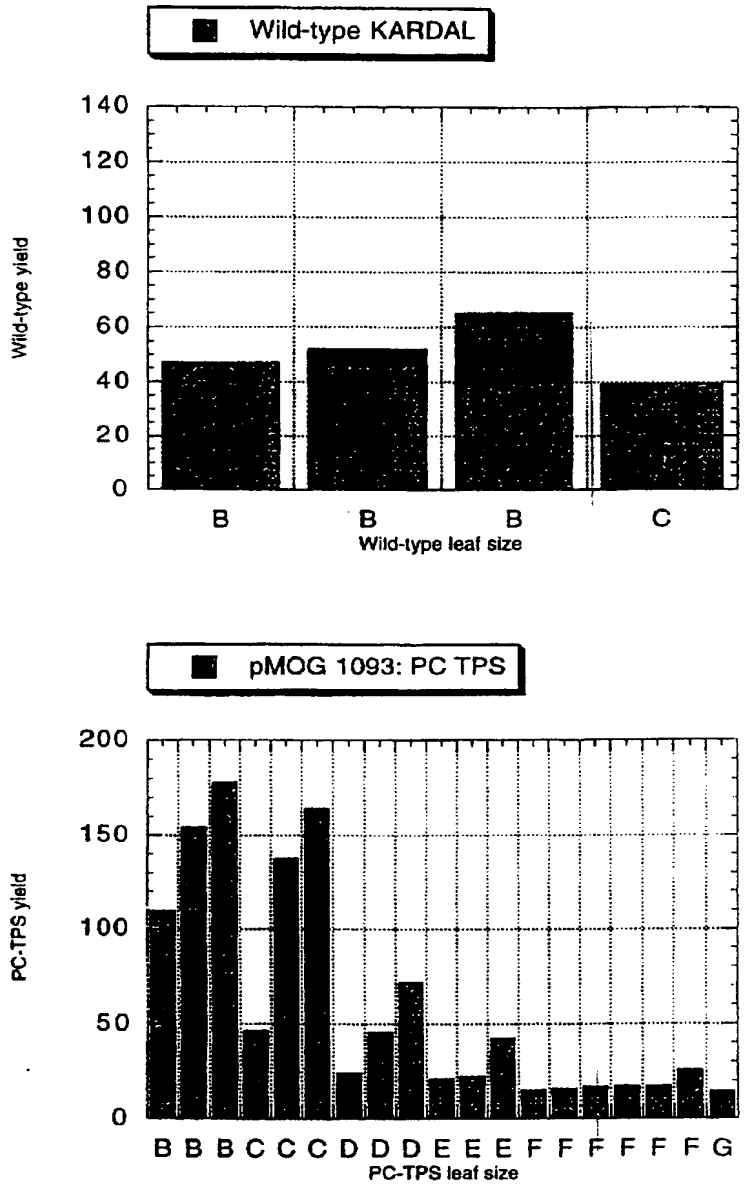

Wild-type KARDAL
140
120
100
80
60
40
20
0
Wild-type yield
B
B
B
C
Wild-type leaf size
pMOG 1093: PC TPS
200
150
100
50
0
PC-TPS yield
B B B C C C D D D E E E F F F F F F G
PC-TPS leaf size

Fig. 26

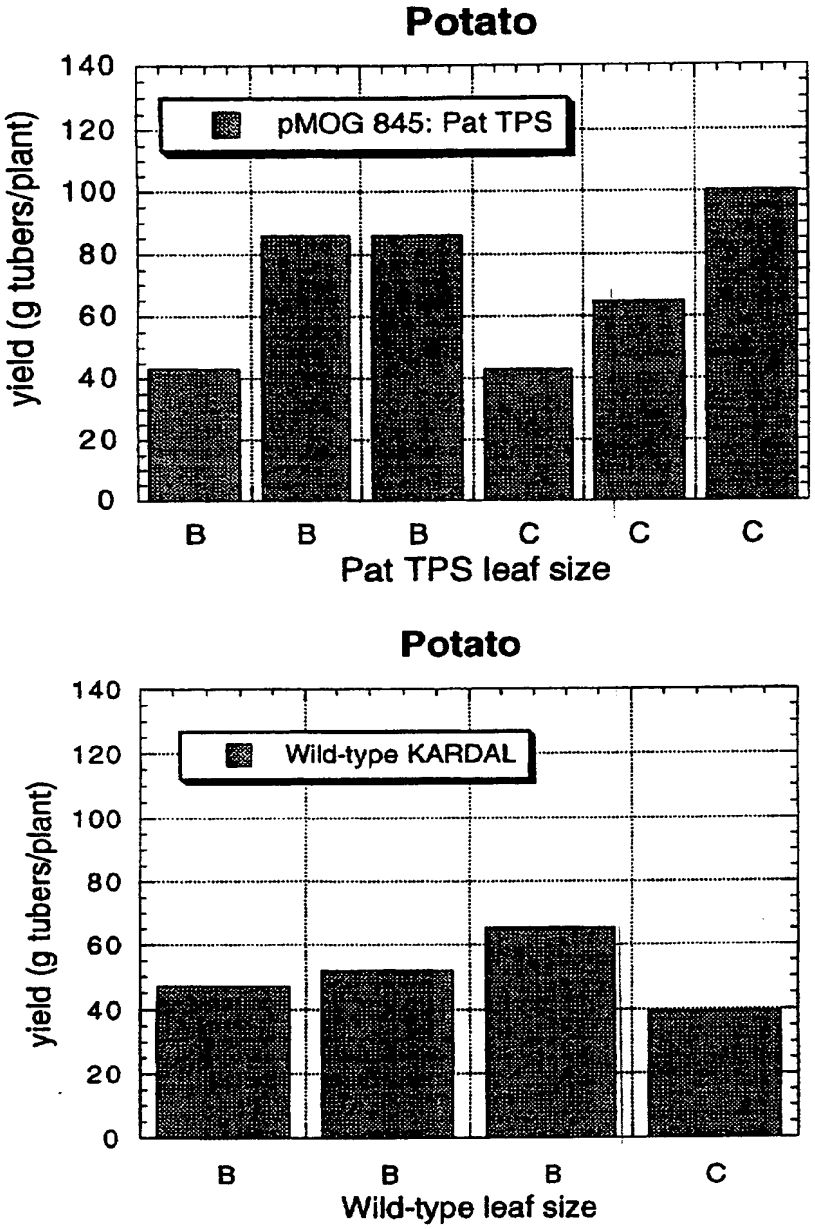

Potato
pMOG 845: Pat TPS
yield (g tubers/plant)
140
120
100
80
60
40
20
0
B B B C C C
Pat TPS leaf size
Potato
Wild-type KARDAL
yield (g tubers/plant)
140
120
100
80
60
40
20
0
B B B C
Wild-type leaf size

Fig. 27

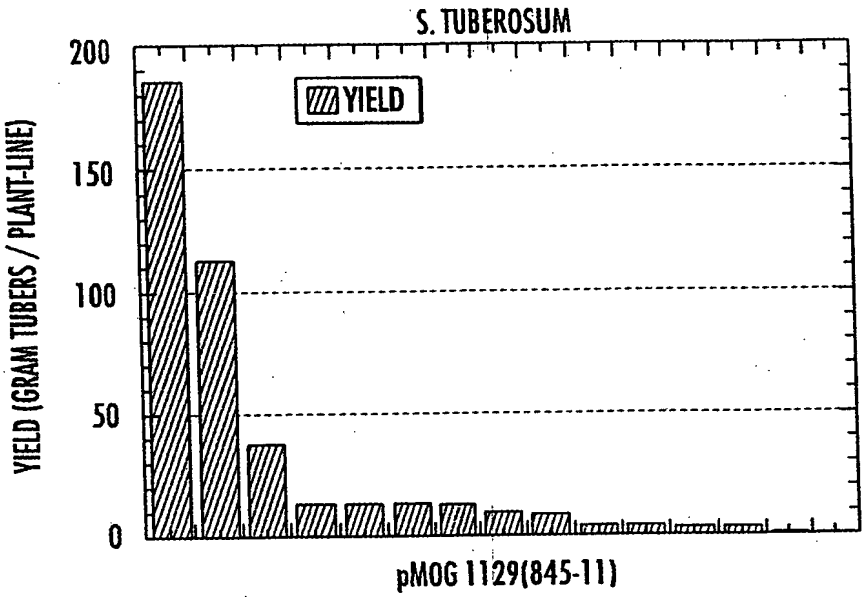


Fig. 28A

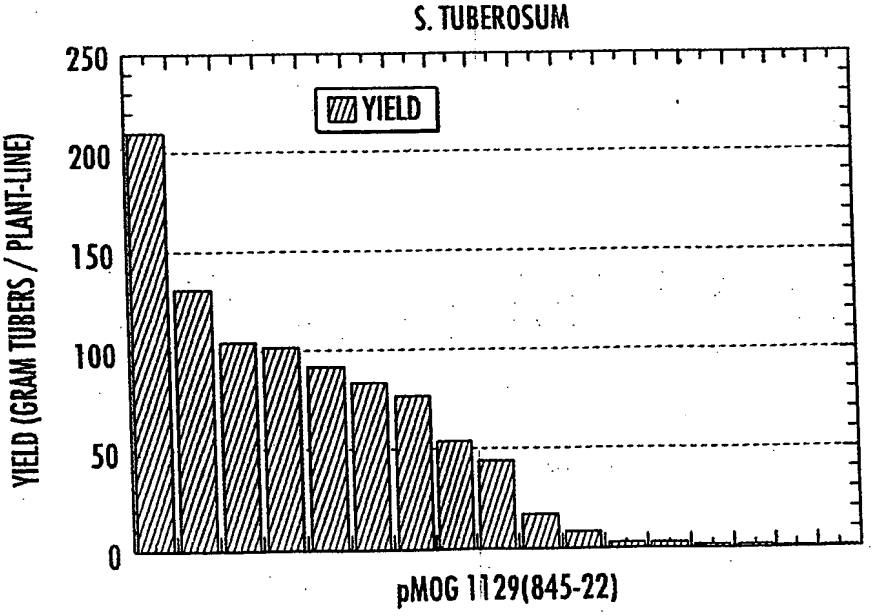


Fig. 28B

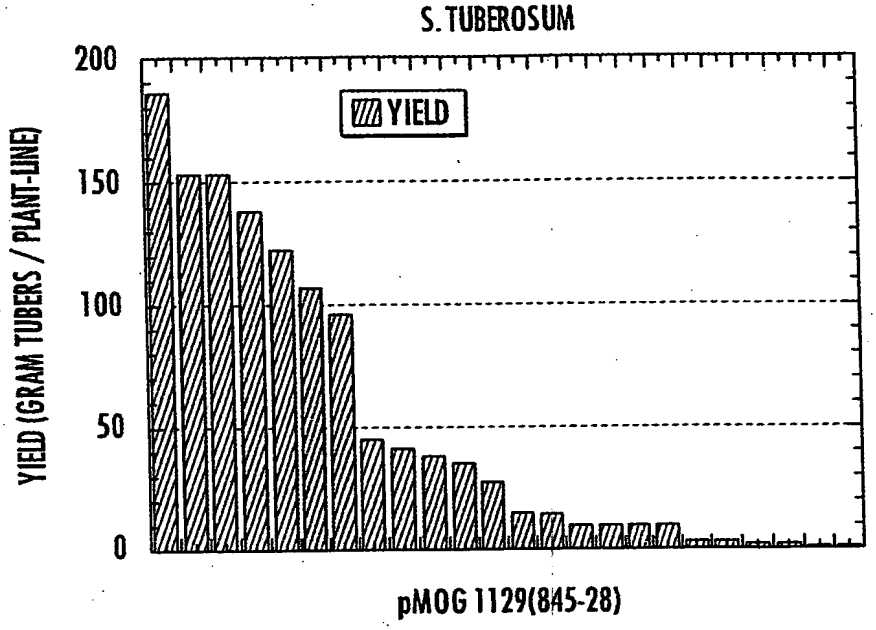
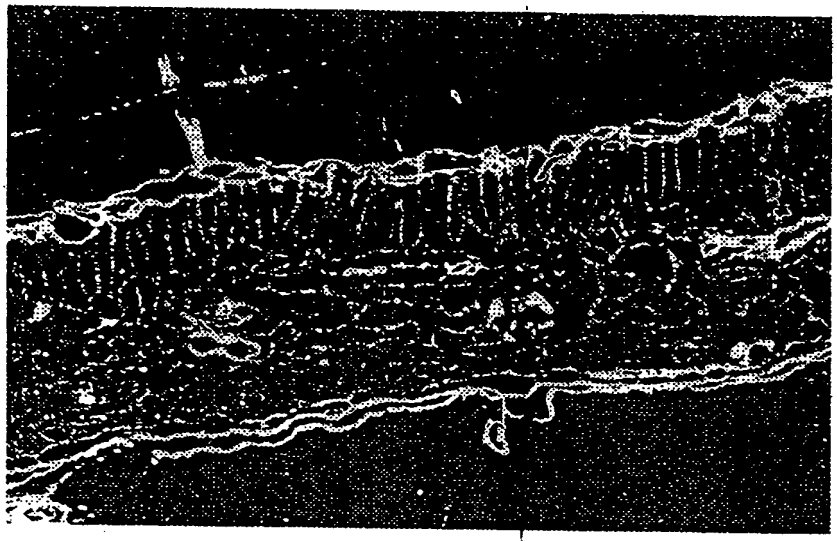
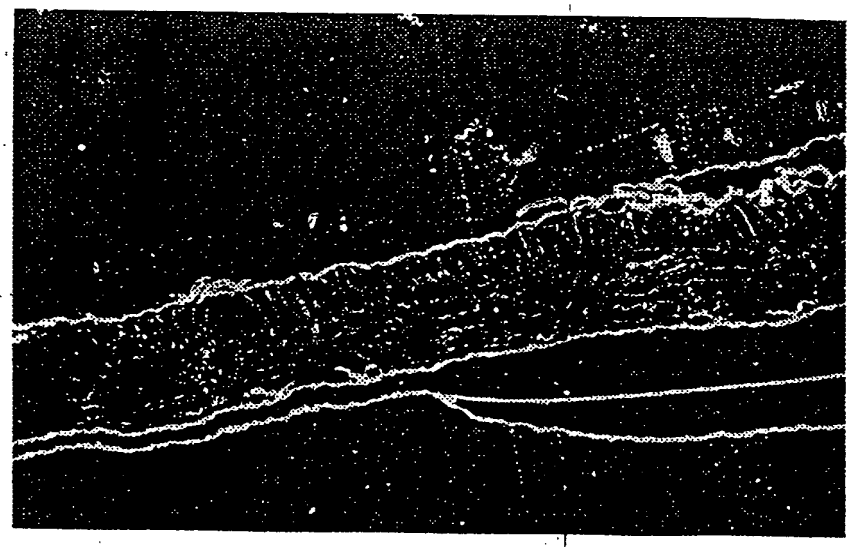

S. TUBEROSUM
YIELD
YIELD (GRAM TUBERS / PLANT-LINE)
200
150
100
50
0
pMOG 1129(845-28)

Fig. 28C



TPS TRANSGENIC TOBACCO LEAF

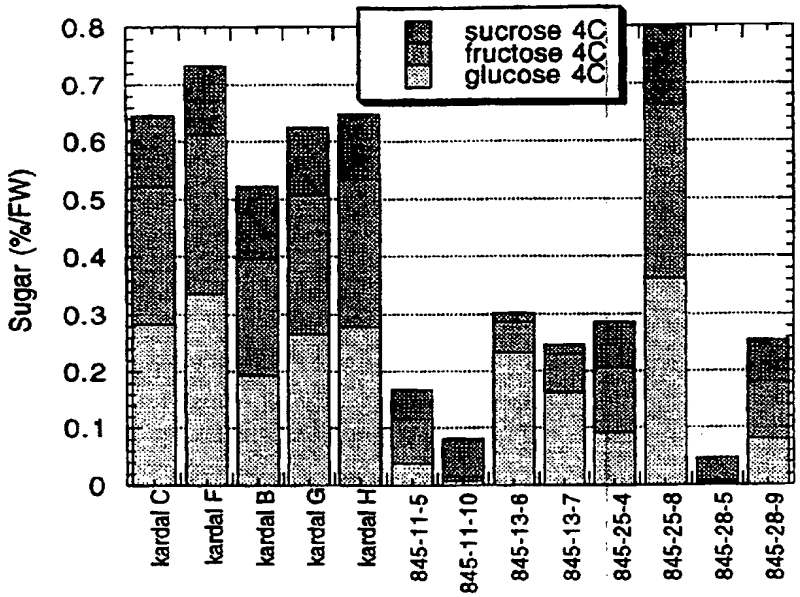
Fig. 29A



TPP TRANSGENIC TOBACCO LEAF

Fig. 29B

S. tub rosum tubers (cv. Kardal)
storage at 4°C



S. tuberosum tubers (cv. Kardal)
sugar profile after harvesting

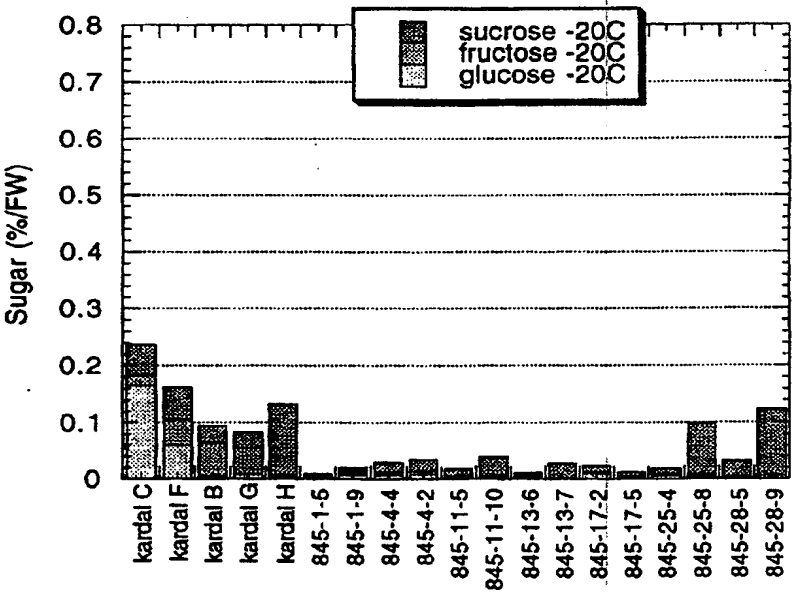


Fig. 30

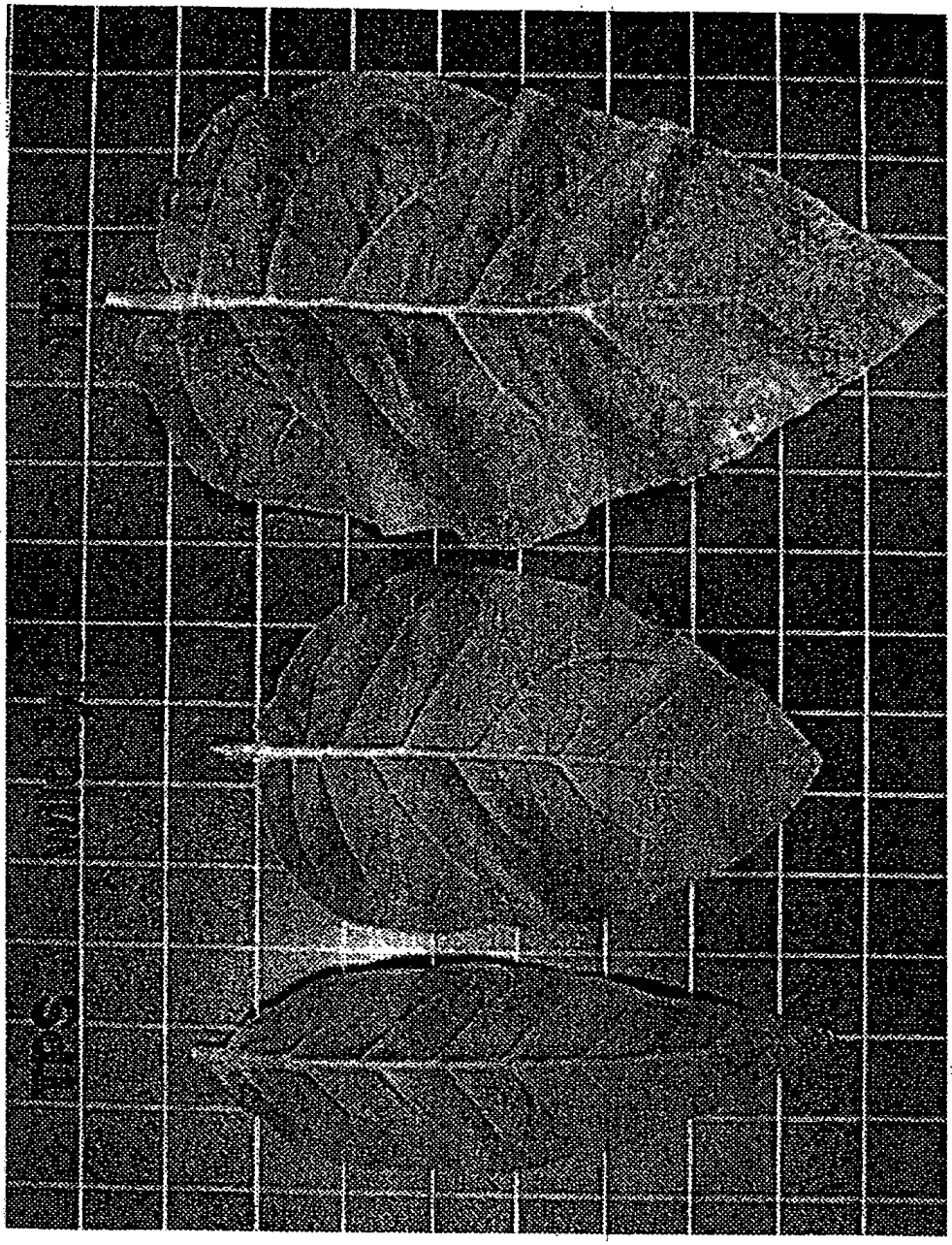


Fig. 31

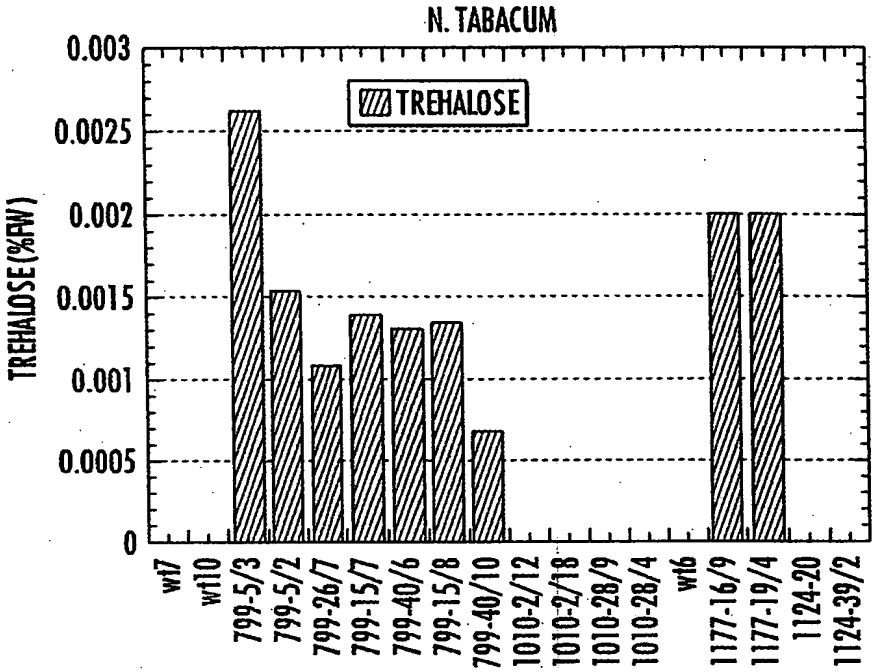


Fig. 32A

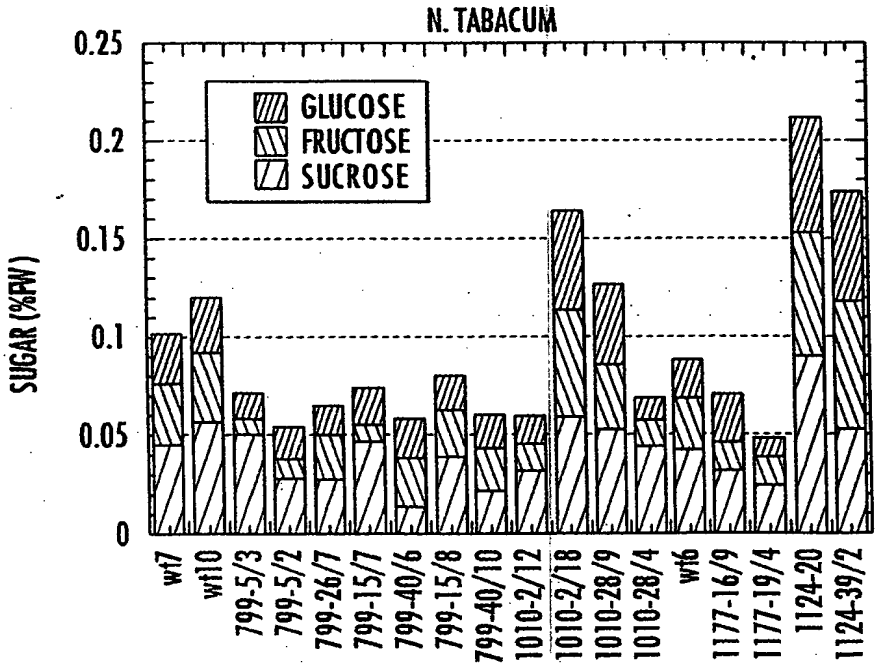


Fig. 32B

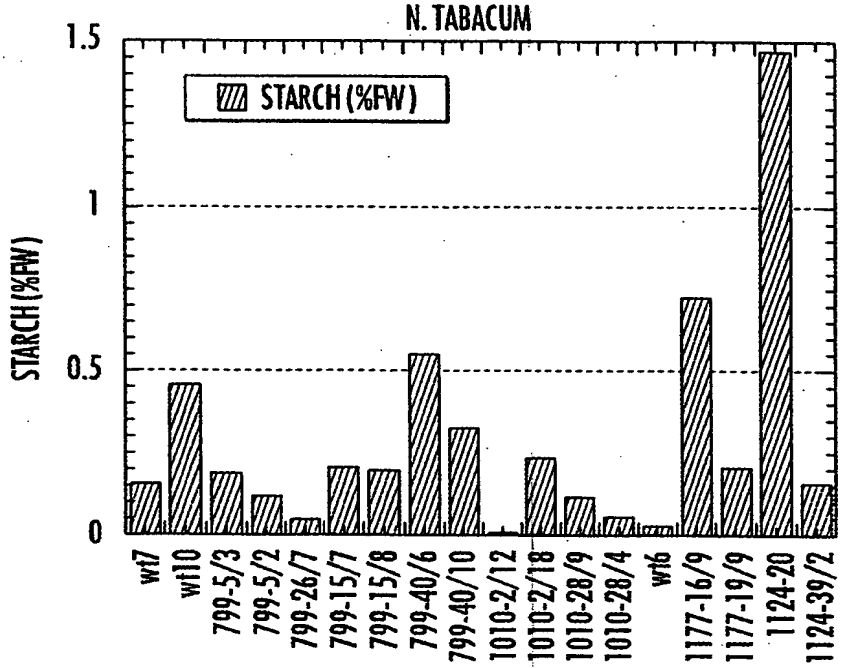


Fig. 32C

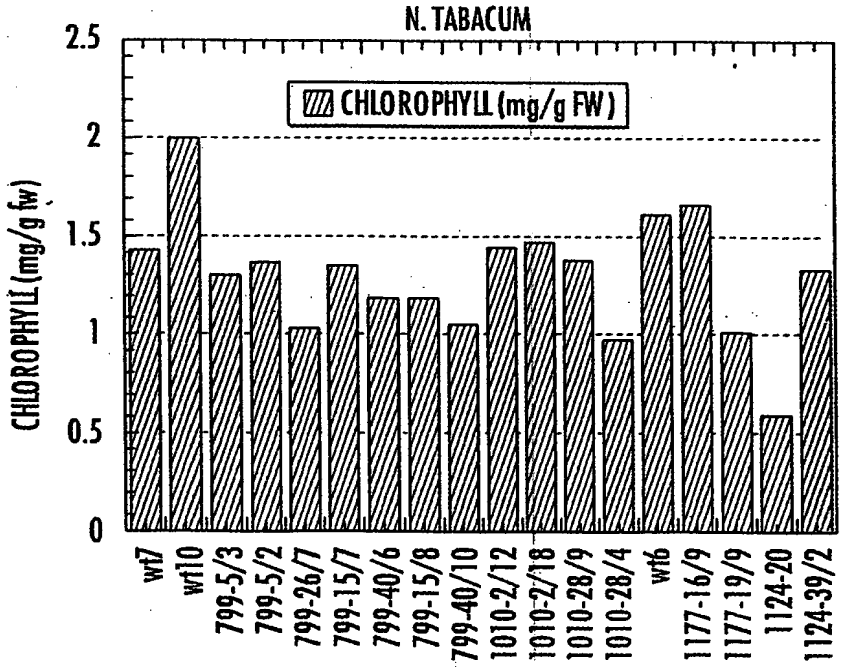


Fig. 32D

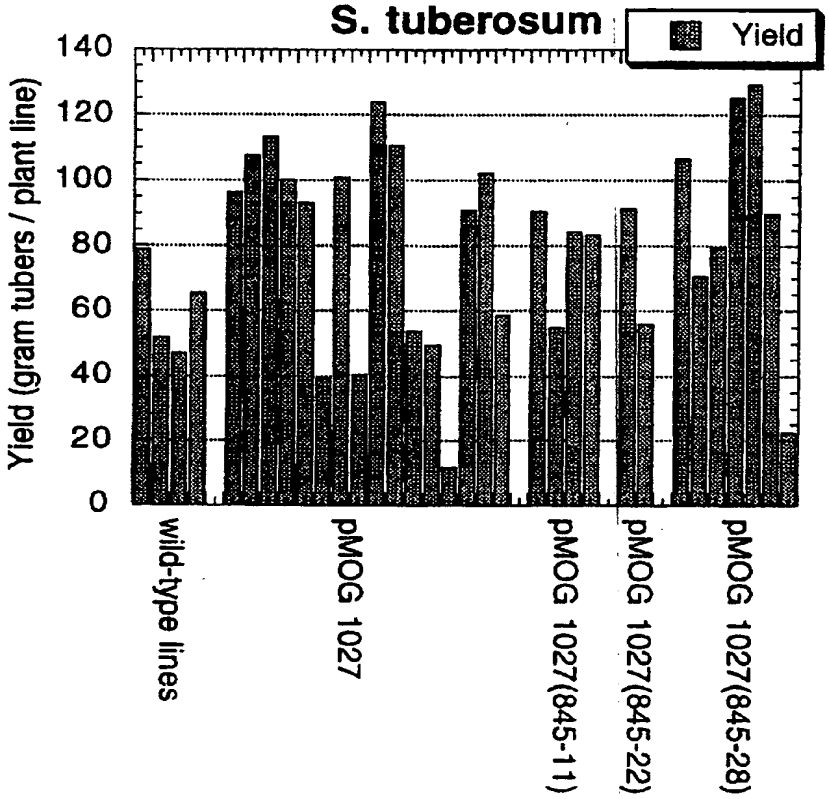

S. tuberosum
Yield
Yield (gram tubers / plant line)
140
120
100
80
60
40
20
0
wild-type lines
pMOG 1027
pMOG 1027(845-11)
pMOG 1027(845-22)
pMOG 1027(845-28)

Fig. 33

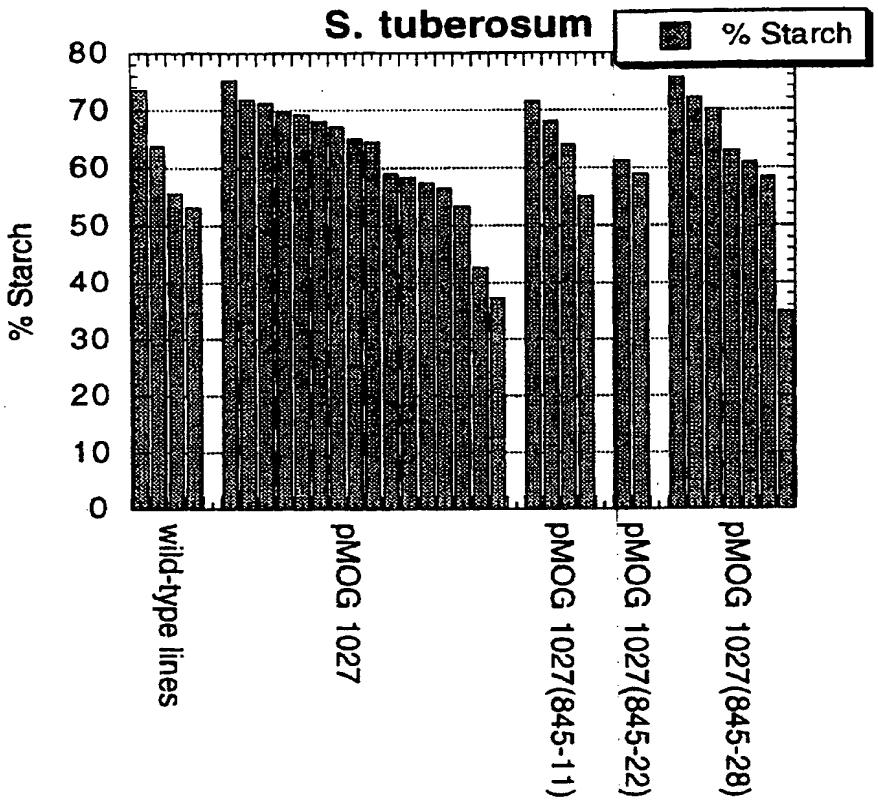

S. tuberosum
% Starch
% Starch
80
70
60
50
40
30
20
10
0
wild-type lines
pMOG 1027
pMOG 1027(845-11)
pMOG 1027(845-22)
pMOG 1027(845-28)

Fig. 34

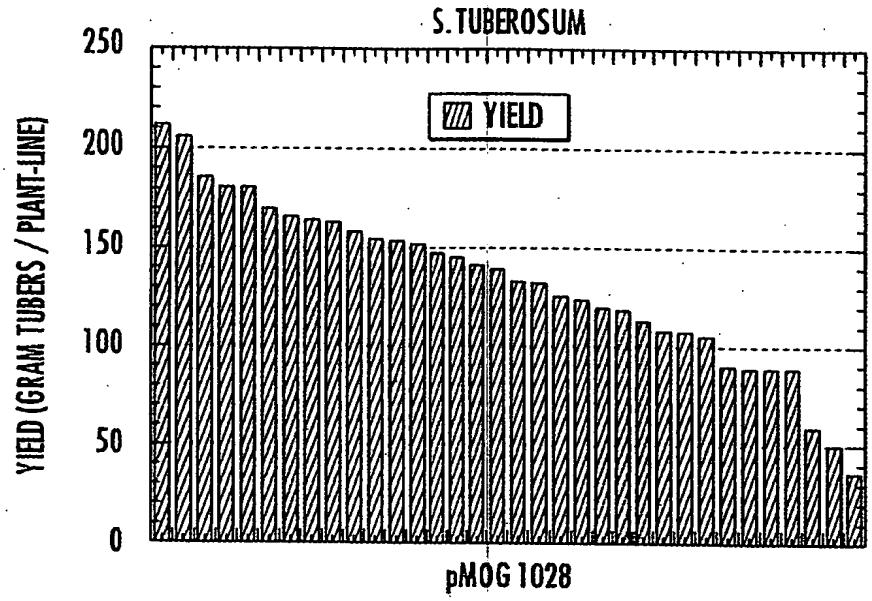


Fig. 35A

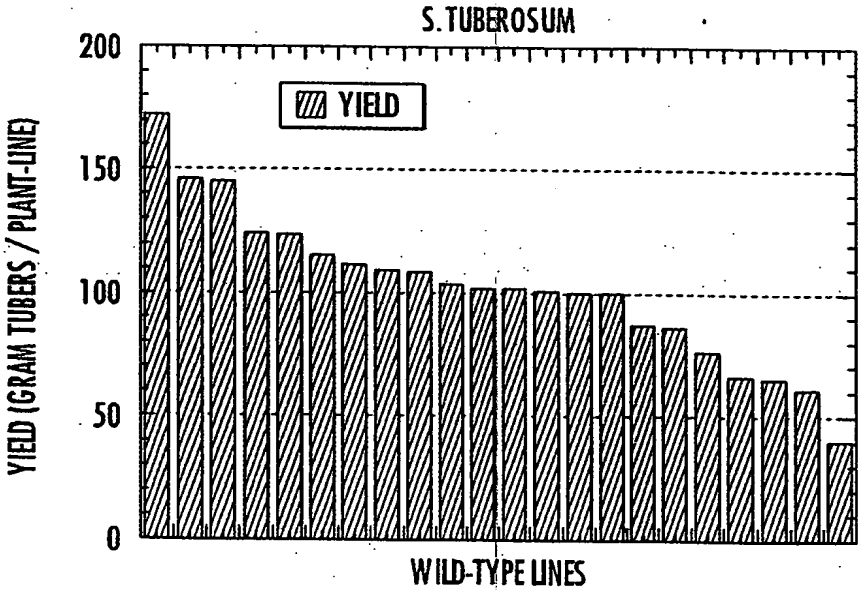


Fig. 35B

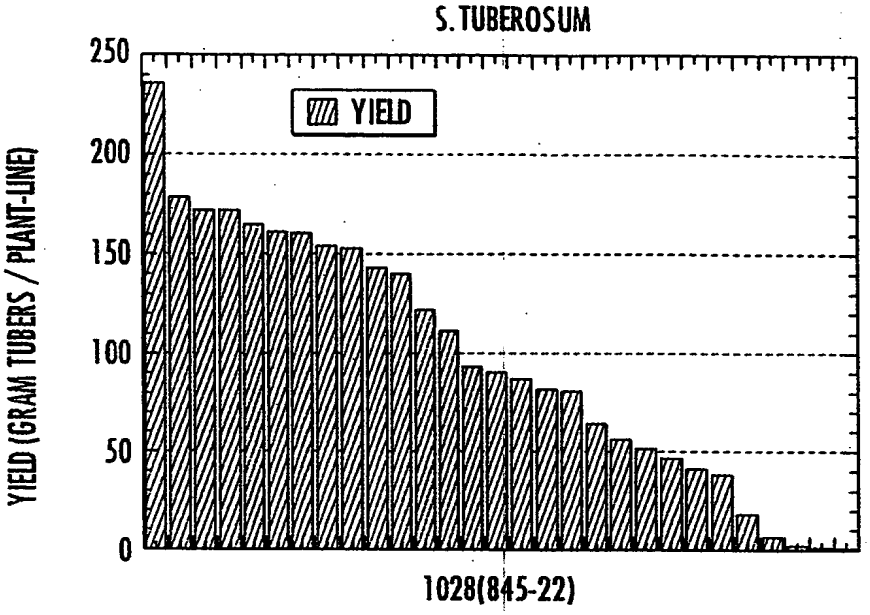


Fig. 35C

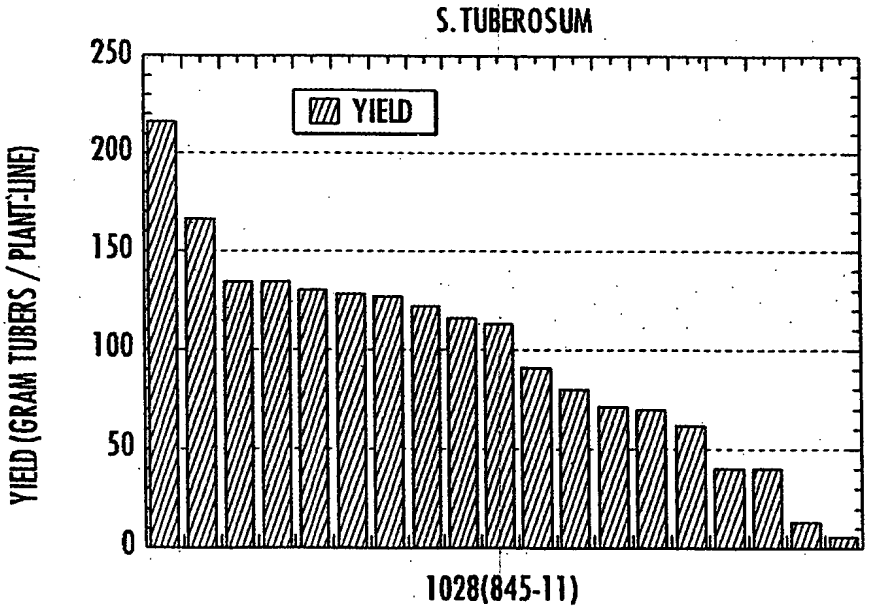


Fig. 35D

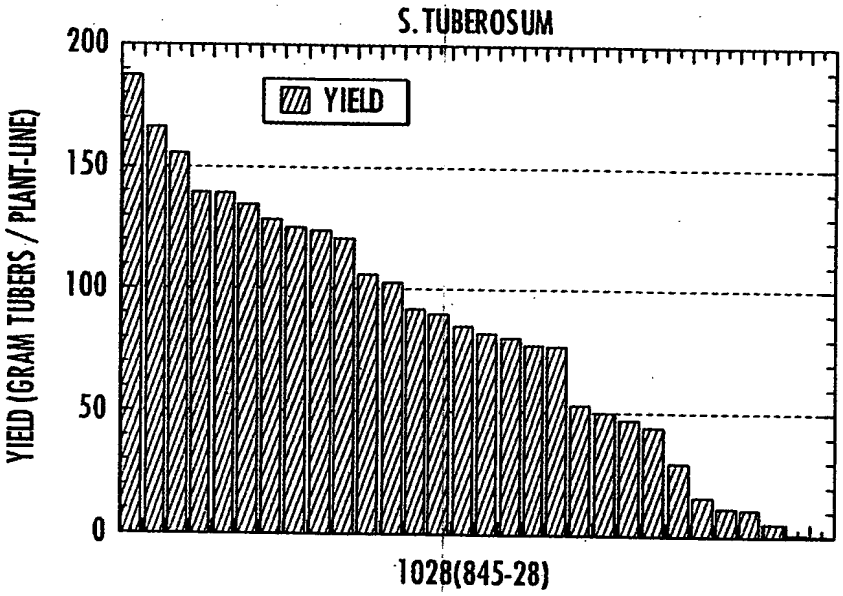

S. TUBEROSUM
YIELD
YIELD (GRAM TUBERS / PLANT-LINE)
200
150
100
50
0
1028(845-28)

Fig. 35E

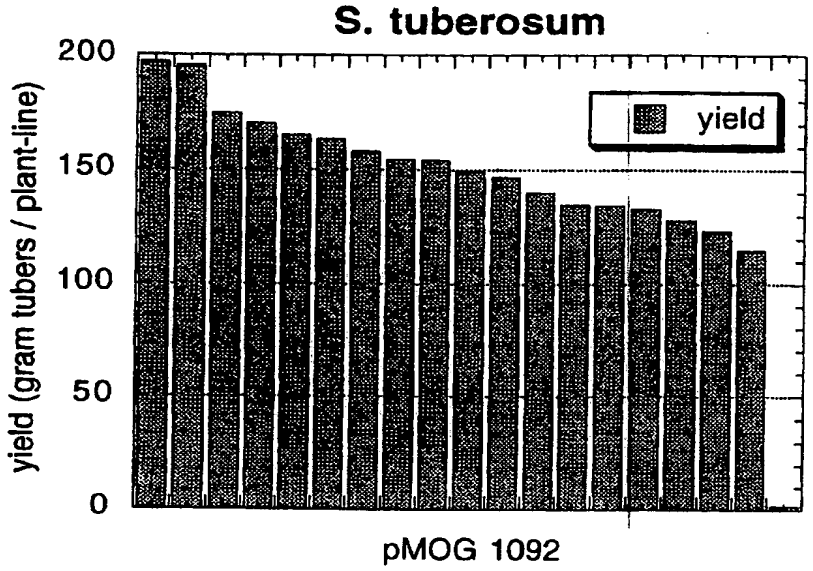

S. tuberosum
200
150
100
50
0
yield (gram tubers / plant-line)
yield
pMOG 1092

Fig. 36

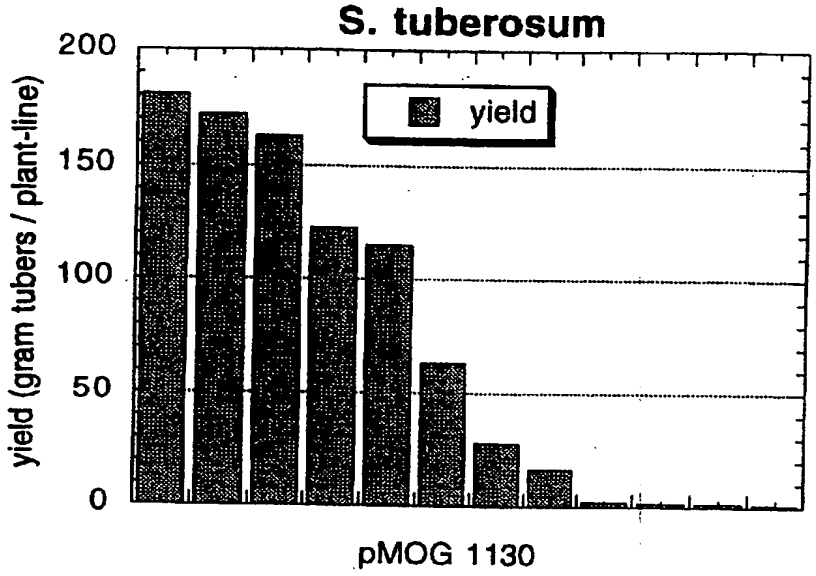

S. tuberosum
yield
yield (gram tubers / plant-line)
200
150
100
50
0
pMOG 1130

Fig. 37